October 29, 1945

STEEL

The Magazine of Metalworking and Metalproducing

ESTABLISHED 1882

CHNOLOGY DEPT.

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APOLLO

STEEL COMPANY

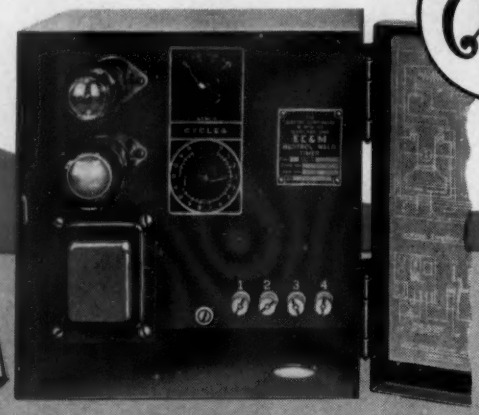
SHEET STEEL
FOR ALL PURPOSES

Galvanized Sheets • Hot Rolled
Hot Rolled Annealed • Single Pickled

Apollo Sales Offices and Operating Departments cooperate at all times to meet customer's requirements. Every order, large or small, is given close personal attention and manufactured under strict laboratory control.

APOLLO STEEL COMPANY
Main Office and Works, Apollo, Pa. Cradle of the Sheet Steel Industry
Pittsburgh Office, Oliver Building

RESISTANCE
WELDER CONTROL



NEOTROL TIMER
Electronic operation--easily adjustable - - timing accurate over entire range.

LINE-ARC CONTACTOR
Fast operating - - sturdily built - - unequaled arc-handling ability.

Good Welds at LOW COST

ESSENTIAL--WHEREVER METALS ARE JOINED

Bomb fins are assembled by spot welding - - a convenient, fast method. Photo courtesy of Thomson-Gibb Electric Welding Co.

Accurate control of the welding current is vital to successful resistance welding. For many years, on thousands of applications, EC&M Welder Control has been providing accurate control and giving universal satisfaction.

Today, we offer many forms of EC&M Timers - - Non-Beat, Auto-Repeat, Pulsation, Sequence, and similar ones designed for specific applications. Also helpful literature for easier, better welding. Ask for booklet 141 and other bulletins, illustrated below, in accordance with your needs.

HELPFUL LITERATURE

Theory and Application of RESISTANCE WELDING, Booklet 141 • NEOTROL or NEOTROL-Compensating Weld Timer, Folder 1201 • EC&M A. C. (Resistance-Welder) CONTACTORS, Bulletin 1211 • EC&M Weld Timers, Bulletin 1201.

THE ELECTRIC CONTROLLER & MANUFACTURING CO.
2698 East 79th St. Cleveland 4, Ohio

LET'S SEE IF WE COULD USE COLD-FORMED SHAPES

Bethlehem Cold-Formed Shapes—light steel sections made in a great diversity of types and sizes, shaped cold in presses, brakes or rolling machines—have brought economies in dozens of cases we could tell you about.

Could *you* use Cold-Formed Shapes, in a product or industrial installation, and take advantage of these potential savings? Naturally, you can't answer that question off-hand. But you'd be surprised at how many firms, faced with unusual design problems, have found that upon considering Cold-Formed Shapes the answer was "yes."

One manufacturer wanted an economical material for jigs. Cold-formed rectangular welded tubing proved ideal. The same type of tubing was used by another firm for run-out tables. Automotive, railway equipment, shipbuilding and metal furniture concerns have found dozens of uses for Cold-Formed Shapes.

Uniformity, precision, smoothness of surface are some of the qualities which Cold-Formed Shapes can bring to your product. With their lightness, these sections save metal and labor costs. They can often be substituted where hot-rolling is either impractical or uneconomical, and can be supplied painted or as weldments.

Look into the advantages of Cold-Formed Shapes. Illustrated booklet, together with full details, is yours for the asking, at the nearest Bethlehem district office, or from Bethlehem Steel Company, Bethlehem, Pa.

★ ★ BETHLEHEM STEEL ★ ★

THE CINCINNATI SHAPER CO.

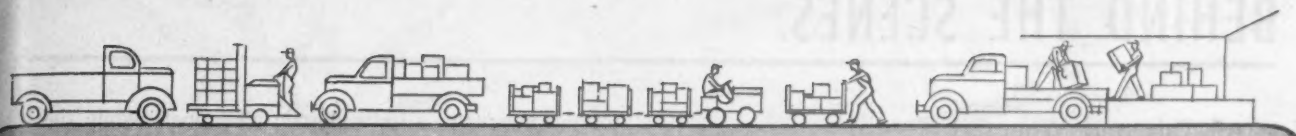
CINCINNATI OHIO U.S.A.

SHAPERS BRAKES SHEARS

Shaping a 10,000 lb. Plate

The Shaper is recognized as indispensable in the toolroom—but many manufacturing jobs are best performed on Shapers. Whether shaping slots in a 10,000-lb. plate or contouring small parts, the power and accuracy of Cincinnati Shapers will meet your requirements.

Write for Calalog N-2



WHY shuttle several costly units from platform to platform when you can

move the whole platform!

One tractor with one driver can keep several platform trailers busy.

Load and unload by running your electric trucks right onto the trailer. Tractor is released for other work while the trailer is being loaded.

Pick up the ready trailer and move it to any part of your plant—from building to building, or from loading to shipping platform.

If you have an extensive intra-plant materials handling problem you can reduce costs and increase efficiency with EASTON off-the-highway platform trailers. The trailer illustrated is the EASTON Model TP-15 built to your standard platform height with 180 sq. ft. of loading area, and a capacity of 30,000 lbs. Other sizes and capacities are available. Write for information: Engineering Counsel, Easton Car & Construction Co., Easton, Pa.

EASTON

TRAILERS · TRUCK BODIES
CARS · ELECTRIC TRUCKS

ENGINEERED

A-1010

BEHIND THE SCENES

All This and Wheaties, Too!

■ If your outfit buys machinery and you are sitting in the office some day when a guy from General Mills sends in his card, don't think he's going to sell you a couple of cases of Wheaties or a barrel of flour, because he isn't. He's going to sell you machinery, because he will be representing one of the newer builders of machinery in the field. No fooling. We don't know if all the machines are going to have a tag on them saying "Made by General Mills, Makers of Wheaties" or not, but we're glad to welcome the flour and breakfast food boys to the fold. Actually it isn't a radical departure, since they've been making their own processing machinery for some years, and during the war made an excellent record in production of war materiel. However, they've decided to spread out and enter the metalworking field really for true. Also, it says on our weekly rumor memo, they are going to make kitchen equipment. Sort of integrating the operation of cake-making, so to speak, with Betty Crocker telling the gals how to do it on the radio, selling them Betty Crocker equipment to make the cake and then supplying the flour for it. They won't have any excuses when the cakes turn out bad.

New Sight In Night Lights

■ Doesn't have much to do with the metalworking industry, but one of the slickest gadgets we've seen lately is a little clear plastic job about the shape and size of a radio dial knob with two metal prongs coming out the back so it can be plugged in a light socket. Inside the plastic case is a neon glow lamp which, according to our editorial staff, draws 1/25 of a watt and will burn all year for about a penny. We've installed a couple at home for night lights, and we can report not a barked shin nor a black eye since.

Tale From the Joss House

■ One of the best tales we've heard recently is supposed to have come out of China. Has to do with a new metal discovered over there. As yet we can't find out how much of the story is true, but this Chinamite, which we shall call it for want of a better name, is really the answer to a metallurgist's prayer. They dig it out of a mountain over there, and it's lighter than magnesium. It has a melting point of 4000 degrees Fahr., but that doesn't worry its promoters because it occurs in nature in a virtually pure state and requires little processing before actual use. The coefficient of expansion of this new deal is zero, and the reported tensile strength is somewhere around 1,000,000 p.s.i. As if these qualifications were not enough to insure a tremendous market for Chinamite, the promoters add that the mountain from which the metal is obtained is located in a volcanic area, and the recurring upheavals have caused a fissure through the center of the mountain. The result has been that the motion of the earth has caused considerable movement on one side while the other has remained virtually unmoved. The movement, combined with heat and the volcanic gases have caused one side of the deposit to exhibit lower fatigue strength than the other. As a result, metal mined on one side of the mountain is quite ductile and tough, while the other side of the mountain yields a hard, brittle formation. Thus, according to the report, it is important to specify either Eastern Chinamite or Western Chinamite when ordering, according to the application involved.

As yet even our nimble, fast-footed space salesmen haven't been able to knock off any advertising contracts on this stuff.

With Tinted and Perfumed Stationery

■ Somebody around here came up with an idea which we think has some merit, although probably very little. Since most business letters tend to be stiff and formal, industrial firms should hire gals who write department store advertising copy to make their letters breezy and informal. We can see them now, answering a complaint letter from a customer, like this:

Dear Sir:

The postman gave us your note the other day, and we tore it open, read it, and then just sat down and cried and cried and cried. Oh, you old meanie, how could you do this to us?

Yours very truly,

This is only for you readers. We don't think we'll have any, thank you.

Are You A Thobber?

■ We have been much intrigued lately by the amount of thobbing which goes on in business today. And we aren't lithping in print, either. Thobbing, it seems, is a legitimate word, more or less, which refers to a special type of rationalization. You're a thobber if you guess at the answer to a problem and then proceed to sell yourself on why that guess is the correct answer to the problem. The same thing applies to any decision you make. If the answer seems to be a little shaky, and you proceed to surround yourself with a lot of facts and semi-facts which show that you're right, you're thobbing. And you don't need a thob thithter to help you, either!

English As She Is Spoke

■ One little thing we've been fighting for all the past ten years around this printshop is the right to use bad grammar, thumb our nose at the style book and flaunt the editorial taboos right here in this column. Nowhere else in the book could we get away with the stuff that goes on here. However, some of the readers in our loyal army rise to make complaints, like Harold Lurie of Cummins Diesel, who objects to our putting subjects of sentences in the objective case, etcetera. Just another case of poetic licentiousness, as we used to say when we wanted to make the English teacher mad.

Stars Over the Penton Building

■ Just as a matter of record, we'd like to point out the service flag of the Penton Publishing Co. contains 40 stars, two of which are gold. Three are back on the job, and we're looking forward to the return of a lot more of them in the very near future.

SHRDLU

Vol. 117, No. 18, October 29, 1945, issue of STEEL, published every Monday at Cleveland, Ohio. Entered as second class matter at the post office, Cleveland, O., under act of March 3, 1879. U. S. and possessions, Canada, Mexico, Cuba, Central and South America, 1 year $6; 2 years $10; all other countries, 1 year $12. Current issues, 25c. Yearbook of Industry issue, $2.00.

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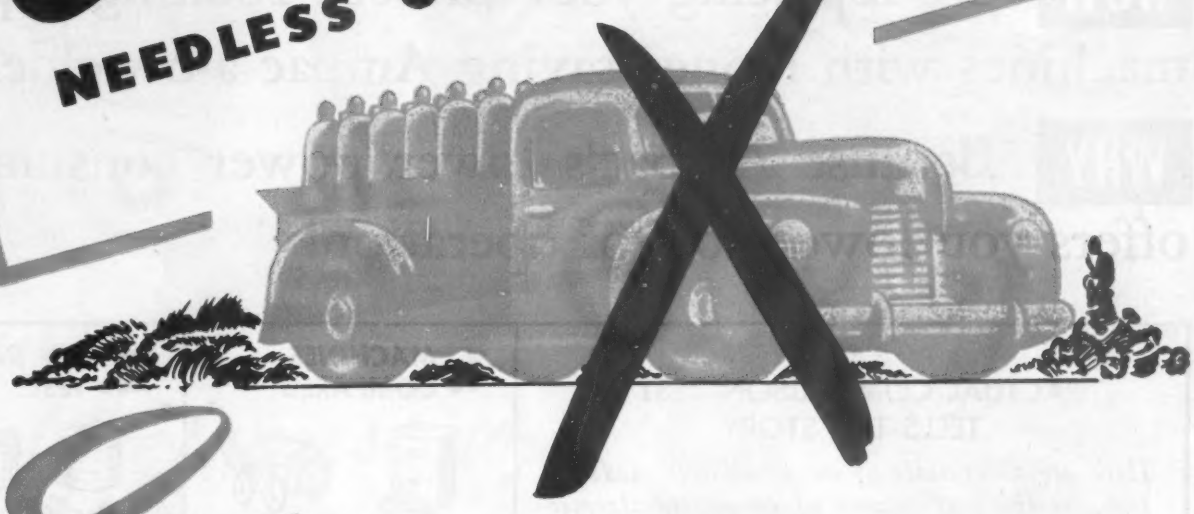
Eliminate

NEEDLESS OXYGEN COSTS



Increase YOUR PROFITS

It costs the average manufacturer about $1.00 to handle a cumbersome, heavy oxygen cylinder from the time it reaches his plant until it leaves.

Approximately 25% of each dollar paid for oxygen in cylinders is for the expensive cylinders themselves, delivery trucks and labor for handling the containers.

You can eliminate these needless oxygen costs and increase your profits by making your own oxygen in your own plant with a modern, thoroughly proven AIR PRODUCTS generator. Let us show you how you can save 50% or more on your oxygen costs. Write today for our free booklet, "MAKING YOUR OWN OXYGEN." No obligation.

2

AIR PRODUCTS, INC.
MANUFACTURERS ROAD
CHATTANOOGA 5, TENN.

Gentlemen:

Please send me a copy of your free booklet, MAKING YOUR OWN OXYGEN.

Name .....

Title .....

Company .....

Street .....

City ..... State .....

Air Products INCORPORATED

Manufacturers Road, Chattanooga 5, Tenn.

Your Weld Production Costs

CAN BE CUT!

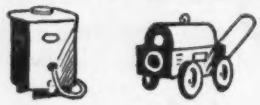
HOW By replacing your present rotating type d-c machines with money-saving Ampac a-c welders.

WHY Because Ampac's lower power consumption offers you lower cost of operation!

ACTUAL COMPARISON TEST TELLS THE STORY

Here are the results of an actual test made to compare the performance of an a-c transformer type welder against a typical d-c motor-generator unit. Both machines were tested under identical conditions and both units were regulated to deliver the same welding power output.

1. MACHINES COMPARED:



AMPAC AC DC UNIT

A leading 200 ampere d-c motor-generator type welder . . . and an Ampac 200 ampere a-c welder.

2. KW INPUT TEST:

AMPAC AC DC UNIT

(Same current output and using same type electrode) . . . d-c welder averaged 9.3 kw . . . Ampac "200" averaged 5.2 kw.

3. IDLING LOSS TEST:

AMPAC AC DC UNIT

The d-c unit showed an idling rate of 1.63 kw . . . economical Ampac "200" had idling rate of only .09 kw.

4. THUS:

Allis-Chalmers a-c welder — Ampac "200" — delivered the same welding power current as the d-c machine although drawing only 56% as much current from the power lines. And Ampac had but 6% of the d-c unit's idling loss! Definite proof that weld production costs can be cut by switching to money-saving Ampac welders.

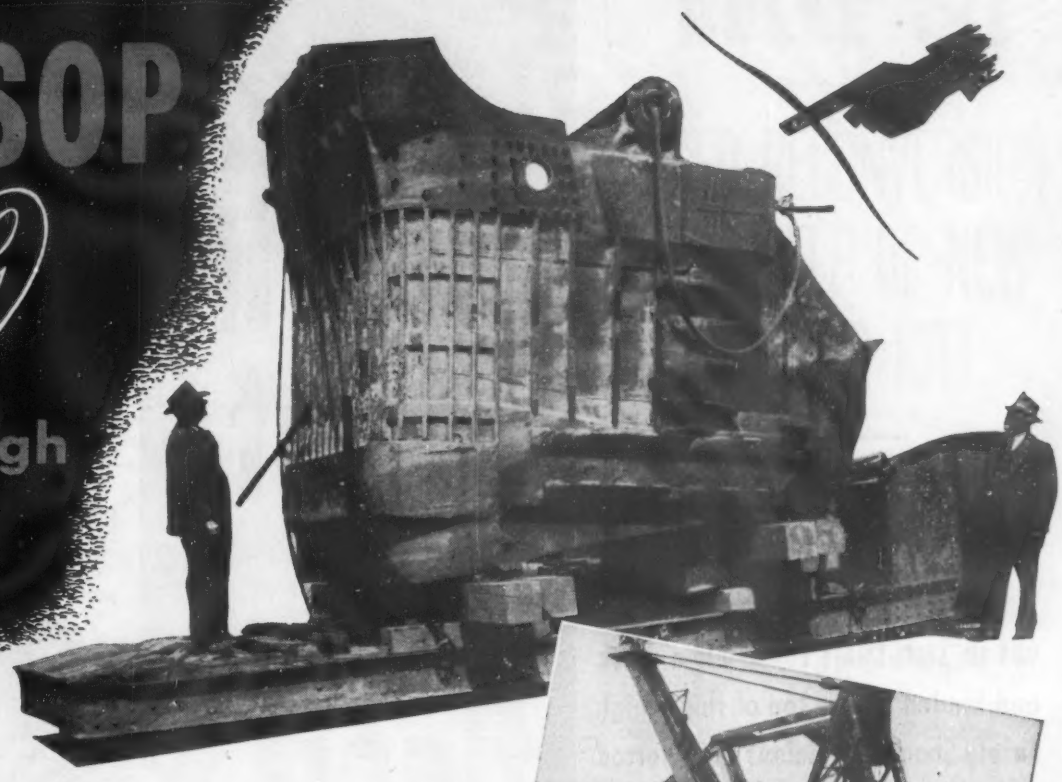
A 1921

PRODUCTION WELDING with its time-saving method of fabrication is playing an important part in the postwar era. But *reduction* in cost is vital. For postwar markets mean *stiff competition.* Allis-Chalmers offers economical Ampac "200" and "400" a-c welders as an aid to low cost production welding. Get full details on the complete A-C welding line — including electrodes and accessories — from our nearby welder dealer or district office. Or write to ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN.

ALLIS-CHALMERS

HEAR THE BOSTON SYMPHONY: *Every Saturday Evening, American Broadcasting Co.*

JESSOP E-9 Super High Tensile Steel



in world's largest size

Shovel

THE enormous size of this shovel, in operation on a large strip coal mining project, is realized when comparison is made with the men and automobile standing under it. Weight of the shovel is 1825 tons. The bucket, which lifts 35 cubic yards at a load, weighs 52 tons when equipped with bale and padlock sheave.

It is significant that Jessop E-9 Super High Tensile Steel appears at the point subject to highest stress, the bale (handle). Additional parts, where E-9 has been installed include the bottom plates, lining and entire middle section of the bucket, as well as the runner shoes. These points are subject to the most intense abrasive action, and also to stresses that demand the maximum in tensile strength. By using Jessop E-9 Super High Tensile Steel welded construction the dead weight of the bucket was minimized so that the payload dirt could be increased.

Choice of Jessop E-9 for this giant was decided on after exhaustive tests were conducted. Similar unusually tough operations have been mastered by several makers of earth moving equipment through the use of this grade. One outstanding example is a coal stacker transport car made entirely of Jessop E-9 in thicknesses of $\frac{3}{16}$" and ¼", replacing aluminum alloys formerly used in thicknesses of ½" to 1". This car has been in continuous day and night operation for five months and shows little wear.

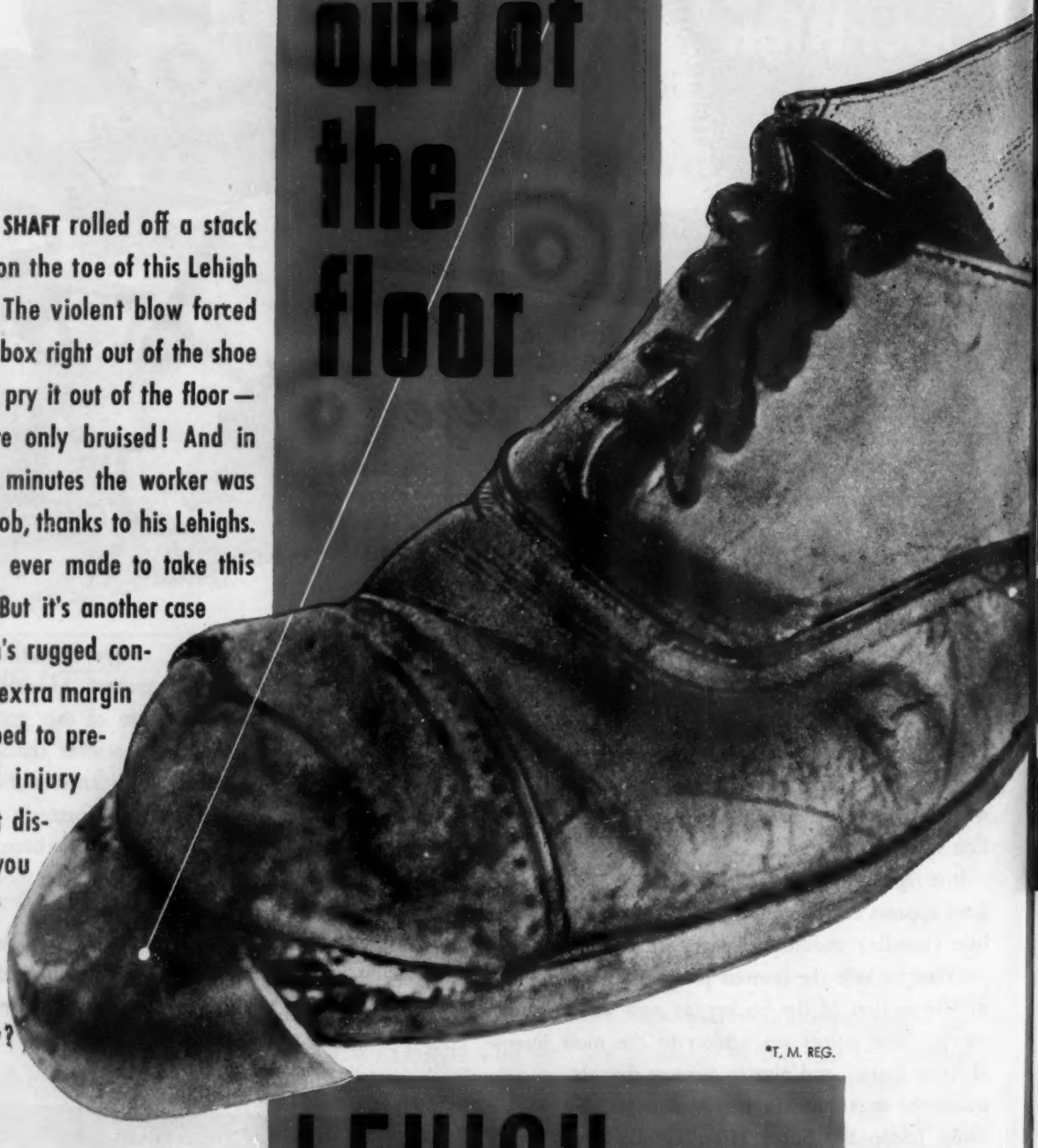
If you have a particularly tough application, requiring greater performance than is obtainable with ordinary alloys, put it up to Jessop Engineers, always available for consultation.

JESSOP STEEL FINE STEELS WASHINGTON, PA. *Established 1901*

JESSOP STEEL Company
Washington, Penna.

we pried it out of the floor

985 LB. STEEL SHAFT rolled off a stack and landed on the toe of this Lehigh Safety Shoe. The violent blow forced the steel toe box right out of the shoe — we had to pry it out of the floor — but toes were only bruised! And in less than 20 minutes the worker was back on the job, thanks to his Lehighs. No shoe was ever made to take this punishment. But it's another case where Lehigh's rugged construction and extra margin of safety helped to prevent serious injury or permanent disability. Have you checked your hospital records for foot injuries lately?



*T. M. REG.

FREE!

Pay envelope enclosure with ten similar case histories will convince any skeptic that safety shoes pay. No advertising. Send for sample or enough to cover your payroll.

LEHIGH ALLENTOWN, PA.

SAFETY SHOE CO., INC.

WESTERN OFFICE: 12th AND SPRUCE, ST. LOUIS 2 MO.

HOODOO SMASHERS!

America's newest and widest line of V-Belts—Allis-Chalmers' Texrope — solves problems that have hoodooed drives in almost every industry . . . see what they can do for you!

I ROUT THAT OLD BUGABOO, STATIC ELECTRICITY. I'M STATIC-RESISTING SUPER-7. MY BUILT-IN CONDUCTING ELEMENT CARRIES CHARGES TO THE MACHINE WHERE THEY'RE GROUNDED.

Texrope V-belts are available nation-wide through Allis-Chalmers Dealers and Sales Offices

IT PAYS TO MAKE

ALLIS-CHALMERS

YOUR V-BELT DRIVE HEADQUARTERS

Texrope Super-7 V-Belts result from the cooperative research of two great companies — Allis-Chalmers and B. F. Goodrich — and are sold exclusively by A-C.

BULLETIN!

SPEED RECONVERSION WITH HELP OF NEW FREE A-C KIT!

Guide to "How to Take Reconversion Inventory" of Drives, Motors, Pumps

Help in the big job of reconverting for peacetime production is now offered to plants everywhere by Allis-Chalmers Mfg. Co., its district offices and distributors. To all who request it, we're sending the new "Reconversion Inventory Kit", planned to speed the task of determining the condition of your existing equipment — V-belt drives, motors, and centrifugal pumps — which will be used in reconverted production.

SUGGESTS PROCEDURE, STATES STANDARDS

Used by foremen, maintenance men, and engineers, the Kit is a real time-saver . . . leads efficiently to probable trouble spots, helps clear them up. Gives bearing tolerances, resistance formulae, etc., in compact, easily-used form. Check List appraisal charts help determine present and future condition of units inventoried.

HOW TO GET YOUR KIT

For your free Reconversion Inventory Kit, call your nearest Allis-Chalmers distributor or district office, or write Dept. 23, ALLIS-CHALMERS MFG. CO., Milwaukee 1, Wis.

A-1910

ALLIS-CHALMERS MFG. CO.
Dept. 23, Milwaukee 1, Wis.

Please send Reconversion Inventory Kit free of charge to:

Company.....

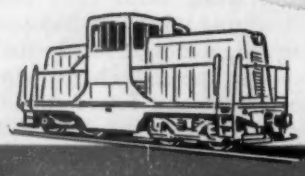
Address.....

.....

Attn. of Mr.....

375,000 lb up a 2.8% for the last three

This 65-ton G-E diesel-electric at the Timken plant regularly handles seven loaded charging buggies on a 2.8 per-cent grade.



GE

diesel-electric INDUSTRIAL LOCOMOTIVES

WHY IT PAYS TO USE DIESEL-ELECTRICS

AVAILABILITY—90 PER CENT UP!

The diesel-electric carries sufficient fuel for several days' operation, runs for long intervals between overhauls, and requires only periodic inspections.

ALWAYS READY TO GO

The diesel-electric starts on the press of a button. No unproductive time is taken to get the locomotive ready for work.

FUEL COSTS LOW

The diesel-electric's high efficiency allows it to operate on a fuel cost that is only a fraction of that of a steam locomotive. Moreover, you don't have to keep the engine running to "keep up steam."

ONE-MAN OPERATION

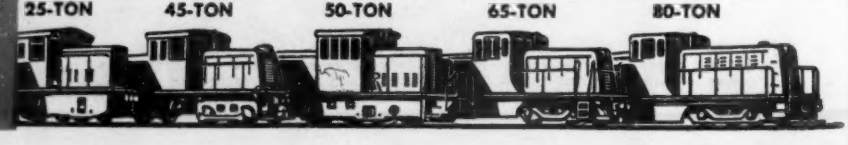
The diesel-electric needs only a one-man crew, as against two usually required on a steam locomotive.

MAINTENANCE SIMPLIFIED

The diesel-electric has no boiler, firebox, or heavy reciprocating parts, thus greatly simplifying maintenance.

A HIGH-RETURN INVESTMENT

Cost records show that G-E diesel-electrics often return 20 to 30 per cent annually.



% grade—24 hr a day e years!

Except for a single eight-hour shift once a month, this powerful 65-ton G-E diesel-electric locomotive at the plant of the Timken Roller Bearing Company, Canton, Ohio, is busy three shifts a day. During its three years' service, this eight hours monthly has been sufficient for all maintenance and inspection needed. It's available for work 97 per cent of the time.

Yet this locomotive has a tough job. It hauls charging buggies continuously from the stock house to the charging ramp for the furnaces, operating for 600 feet over a 2.8 per-cent grade. On this grade, it handles from five to seven loaded buggies at a time. These loads average 375,000 lb.

The locomotive carries sufficient fuel for 72 hours operation. It consumes approximately 65 gallons of fuel oil a day, an average of 2.7 gallons an hour. At six cents a gallon, the fuel cost per hour is only 16.2 cents.

In other plants, G-E diesel-electrics are doing similar spectacular jobs under different, but equally difficult, conditions. In many cases the resulting savings have been sufficient to make an annual return of 20 per cent to 30 per cent on the investment.

Your G-E representative will gladly make a survey of your motive power requirements, or give you full data on the complete line of G-E diesel-electrics, which are built from the rails up by General Electric. Apparatus Department, General Electric Company, Schenectady 5, N. Y.

GENERAL ELECTRIC

120-12-9505

Buy all the BONDS you can—
and keep all you buy

For Civilian Use...

***NITRALLOY—HARDEST STEEL SURFACE KNOWN**

Priorities are off. Nitralloy is available again—in any quantities—to fight wear and fatigue in *civilian* metal products.

The endurance, the *selling features,* that Nitralloy can impart to peacetime machines is indicated in the performance of Nitralloy in war. In army tanks, Nitrided Nitralloy parts operated against each other in sand, moist atmosphere and heat—without lubrication—and *stood up.* Engines with cylinder barrels, reduction gears and other vital parts of Nitralloy carried bombers the equivalent of eight and ten times around the earth, without overhaul.

With an approximate Vickers-Brinell value of 900 to 1100—with its ability to retain hardness at temperatures up to 750° F.—Nitralloy merits the investigation of design engineers for extra life and reliability in bearings, cams, pump parts, shafts, gears . . . any application where wear is a factor.

Nitralloy licensees and warehouses can supply your needs today. For details on how you may apply Nitrided Nitralloy to best advantage, write on your business letterhead for booklets "Nitralloy," "Hardness," "Fatigue of Metals" or "Wear."

THE NITRALLOY CORPORATION
230 PARK AVENUE
NEW YORK 17, N. Y.

Companies Licensed by The Nitralloy Corporation

Allegheny Ludlum Steel Corp.	Watervliet, N. Y.
The Babcock & Wilcox Tube Co.	Beaver Falls, Pa.
Bethlehem Steel Co.	Bethlehem, Pa.
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Crucible Steel Co. of America	New York, N. Y.
Firth-Sterling Steel Co.	McKeesport, Pa.
Republic Steel Corporation	Cleveland, O.
The Timken Roller Bearing Co.	Canton, O.
Rotary Electric Steel Co.	Detroit, Mich.
Vanadium-Alloys Steel Co.	Pittsburgh, Pa.
Atlas Steel Limited	Welland, Ontario

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Lindberg Steel Treating Co.	Chicago, Ill.
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Met-Lab, Inc.	Philadelphia, Pa.
New England Metallurgical Corp.	Boston, Mass.
Pittsburgh Commercial Heat Treating Co.	Pittsburgh, Pa.
Queen City Steel Treating Co.	Cincinnati, O.
Rex & Erb	Lansdale, Pa.
The Salkover Metal Processing Co., Inc.	Long Island City, N. Y.
Wesley Steel Treating Co.	Milwaukee, Wis.
N. A. Woodworth Co.	Ferndale, Mich.
Ontario Research Foundation	Toronto, Ontario, Can.

Manufacturers of Nitralloy Steel Castings

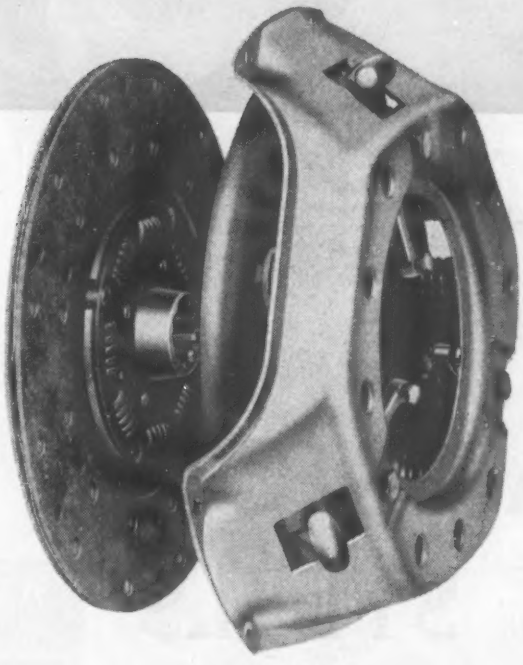
Milwaukee Steel Foundry Div., Grede Foundries, Inc.	Milwaukee, Wis.

Warehouse & Stock

A. Milne & Co.	New York, N. Y.
Joseph T. Ryerson & Son, Inc.	Chicago, Ill.
Edgcomb Steel Company	Philadelphia, Pa.

You'd start like this

–if it weren't for SPRINGS!



Muehlhausen Springs are used in Long Clutches to transmit power with "creamy" smoothness.

Smooth, easy starting is taken for granted by the average motorist. But we seldom realize that each time we stop-and-go or change a gear, clutch springs must transmit and cushion a surge of engine power.

This cushioning action is accomplished in the Long Clutch by means of Muehlhausen Damper Springs, which transmit engine power from the driven disc to the splined hub flange.

Another set of Muehlhausen Springs is in the pressure plate assembly. These springs hold the pressure plate squarely and uniformly against the driving plate—and do this while withstanding scorching engine heat.

MUEHLHAUSEN SPRING CORPORATION
(Division of Standard Steel Spring Company)
921 Michigan Avenue, Logansport, Indiana

To improve product performance, use MUEHLHAUSEN Designed SPRINGS

ARISTOLOY PRECISION CONTROLLED
ELECTRIC FURNACE STEELS HIT THE MARK

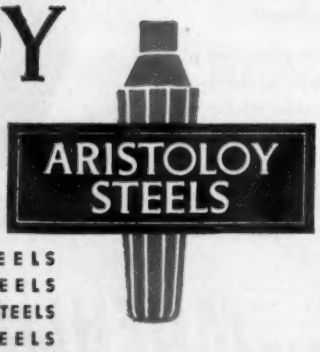
Why
ARISTOLOY STEELS

Your job NOW is producing peacetime products in keeping with the tempo and quality set by war demands.

That's why you need ARISTOLOY Alloy Steels. They will flow smoothly and rapidly through your production machinery. They are made in a plant completely integrated and departmentalized for the efficient production of alloy steels. Each step, from melting to shipping is closely checked by experienced alloy steel makers. We have complete modern facilities for annealing and heat treating, rough turning, centerless grinding, turning and polishing and cold drawing.

There is no reconversion problem at Copperweld. ARISTOLOY Steels are available NOW.

ARISTOLOY STEELS



STANDARD STRUCTURAL ALLOY STEELS
MAGNAFLUX-AIRCRAFT QUALITY STEELS
BEARING QUALITY STEELS • CARBON TOOL STEELS
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COPPERWELD STEEL COMPANY • WARREN, OHIO
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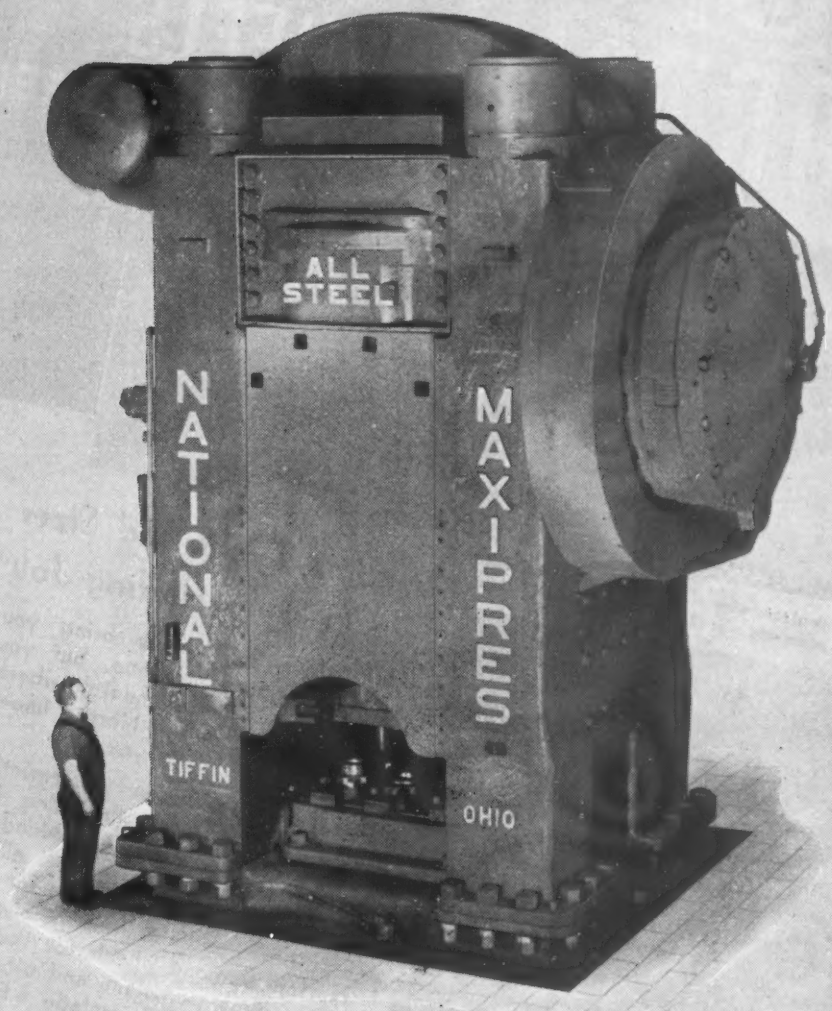
ARISTOLOY STEEL INTERNATIONAL COMPANY
Export Division • 815 - 15th Street • Washington, D. C.

A NEW MAXIPRES



The above photo shows the new National No. 7½ High Speed Forging Maxipres—weight 800,000 pounds—the World's largest.

This machine operates at a speed of 50 strokes per minute, and produces in one blow, in each die impression, the size of forgings normally handled on an 8,000 pound steam hammer.

Large wheel hubs, gear blanks, pipe flanges, crankshafts, cylinder heads, connecting rods, side bar links, bearing races, and a wide variety of similar work will be regular peace time jobs for this machine.

It will pay you to fully investigate Maxipres Forging. Tell us the nature of your forging work, and we will send complete details.

NATIONAL
MACHINERY COMPANY
TIFFIN, OHIO.

New York Detroit Chicago

RECONVERT with NORTON GRINDING WHEELS WHERE YOU NEED THEM!

FACTORY STOCK

Thousands of square feet of stock rooms at the Worcester factory containing over 18,000 different abrasive items.

WAREHOUSE STOCKS

Well-stocked warehouses in five industrial centers—Chicago, Detroit, Cleveland, Pittsburgh and Philadelphia.

DISTRIBUTOR STOCKS

Over 200 distributors in 184 cities with stocks selected to meet local needs.

And in Types and Sizes for Every Grinding Job

RECONVERSION may bring you new grinding problems, but you can be sure of finding the right wheels to solve them in the Norton line—and stocked handy to you.

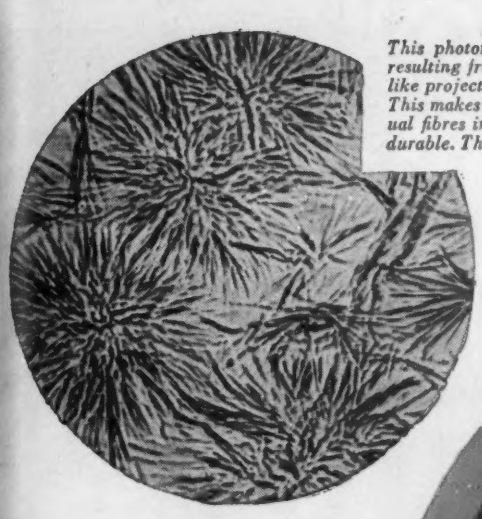
There are wheels in several varieties of Alundum abrasive (including the new record-breaking 57 Alundum) for grinding steels and steel alloys; wheels of Crystolon abrasive for cast iron, brass, and the light metals; and Norton diamond wheels for the carbides, glass, porcelain, and other unusual jobs. Bonds include B-E vitrified, resinoid, rubber, shellac, and silicate. And of course there's the patented Norton Controlled Structure process of manufacture.

Reconverting with Norton assures you the right wheel for each new grinding job and the engineering "know-how" to select them for you.

NORTON COMPANY, Worcester 6, Mass.

Behr-Manning, Troy, N. Y., is a Norton Division

NORTON ABRASIVES



This photomicrograph shows the distinctive lead "soap" formations resulting from Red Lead's reaction with the vehicle. Note how the rod-like projections radiating from central cores spread out and intermesh. This makes a strong, flexible, interwoven structure—just as the individual fibres in a piece of cloth are intertwined to make cloth tough and durable. This type of soap formation is unique with "lead" paint films.

unique LEAD SOAPS...

another important reason why RED LEAD means Extra Rust Protection

Why is Red Lead outstanding as a metal protector?

One of the major reasons is this pigment's remarkable ability to impart to the paint film strong, tough, intertwining lead "soap" formations—as shown in the photomicrograph above.

These unique lead "soaps" improve the paint film in many ways. For one thing, they form a dense, intermeshing matrix which restricts the passage of water through the film. And rusting does not take place without the presence of moisture.

For another, they *mechanically* reinforce the film, giving it extra *strength* and *toughness.*

And again, Red Lead "soaps" contribute all-important *elasticity* – allowing movement along their intermeshing projections. This action helps prevent the ruptures to which a hard, unyielding film is subject. Moreover, when a paint film dries and ages, decomposition of the vehicle sets in. But, because of Red Lead's ability to combine with the decomposition products and form soaps, it increases both the durability of the paint film and its adhesion to the base metal.

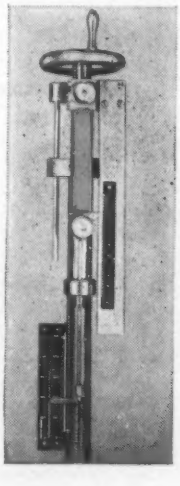
Red Lead's extra strength, toughness and elasticity are demonstrated by the tensile strength test below and substantiated by exhaustive research and field service.

Remember, too, that Red Lead is compatible with practically all vehicles commonly used in metal protective paints, including phenolic and alkyd resin types.

Specify RED LEAD for All Metal Protective Paints

The value of Red Lead as a rust preventive is most fully realized in a paint where it is the only pigment used. However, its rust-resistant properties are so pronounced that it also improves any multiple pigment paint.

* * *



In this tensile strength tester a typical Red Lead paint film has been stretched 18% without breaking. In withstanding this elongation it has maintained a load of 920 grams. Any film that exhibits these characteristics has unusual strength, toughness and elasticity. As metals expand and contract only a fraction of one percent, this film would adhere under the most extreme conditions.

No matter what price you pay, you'll get a better paint for surface protection of metal, if it contains Red Lead.

Write for New Booklet—"Red Lead in Corrosion Resistant Paints" is an up-to-date, authoritative guide for those responsible for specifying and formulating paint for structural iron and steel. It describes in detail the scientific reasons why Red Lead gives superior protection. It also includes typical specification formulas—ranging from Red Lead-Linseed Oil paints to Red Lead-Mixed Pigment-Varnish types. If you haven't received your copy, address nearest branch listed below.

* * *

All types of metal protective paints are constantly being tested at National Lead's many proving grounds. The benefit of our extensive experience with Red Lead paints for both underwater and atmospheric use is available through our technical staff.

NATIONAL LEAD COMPANY: New York 6, Buffalo 3, Chicago 80, Cincinnati 3, Cleveland 13, St. Louis 1, San Francisco 10, Boston 6 (National-Boston Lead Co.); Pittsburgh 30 (National Lead & Oil Co. of Penna); Philadelphia 7 (John T. Lewis & Bros. Co.); Charleston, W. Va. (Evans Lead Division).

DUTCH BOY RED LEAD

Why don't you get together on proof that you both can count on?

Confidential note to machine-builders and manufacturers of mechanical products (with a couple of side remarks to users):—

It's as simple as this: Build into your machine or product, as an integral part, a Veeder-Root Counting Device that registers strokes, turns, pieces, trips, and many other units of performance . . . mechanically or electrically. Then your customers can *see* when your guarantee period is reached . . . for the Facts-in-Figures are right there in front of them in plain, bold black and white. So there's no room for argument, no needless loss of goodwill or future business through lack of positive proof.

There are Veeder-Root Devices that will record the exact number of performance-units constituting the guarantee period. And then these devices will go on proving to your customers that they're getting all the performance you built into your product. You are invited to take "*Count*sel" with Veeder-Root engineers, who will show you just how you can protect and profit yourself with built-in Veeder-Root *Count*rol.

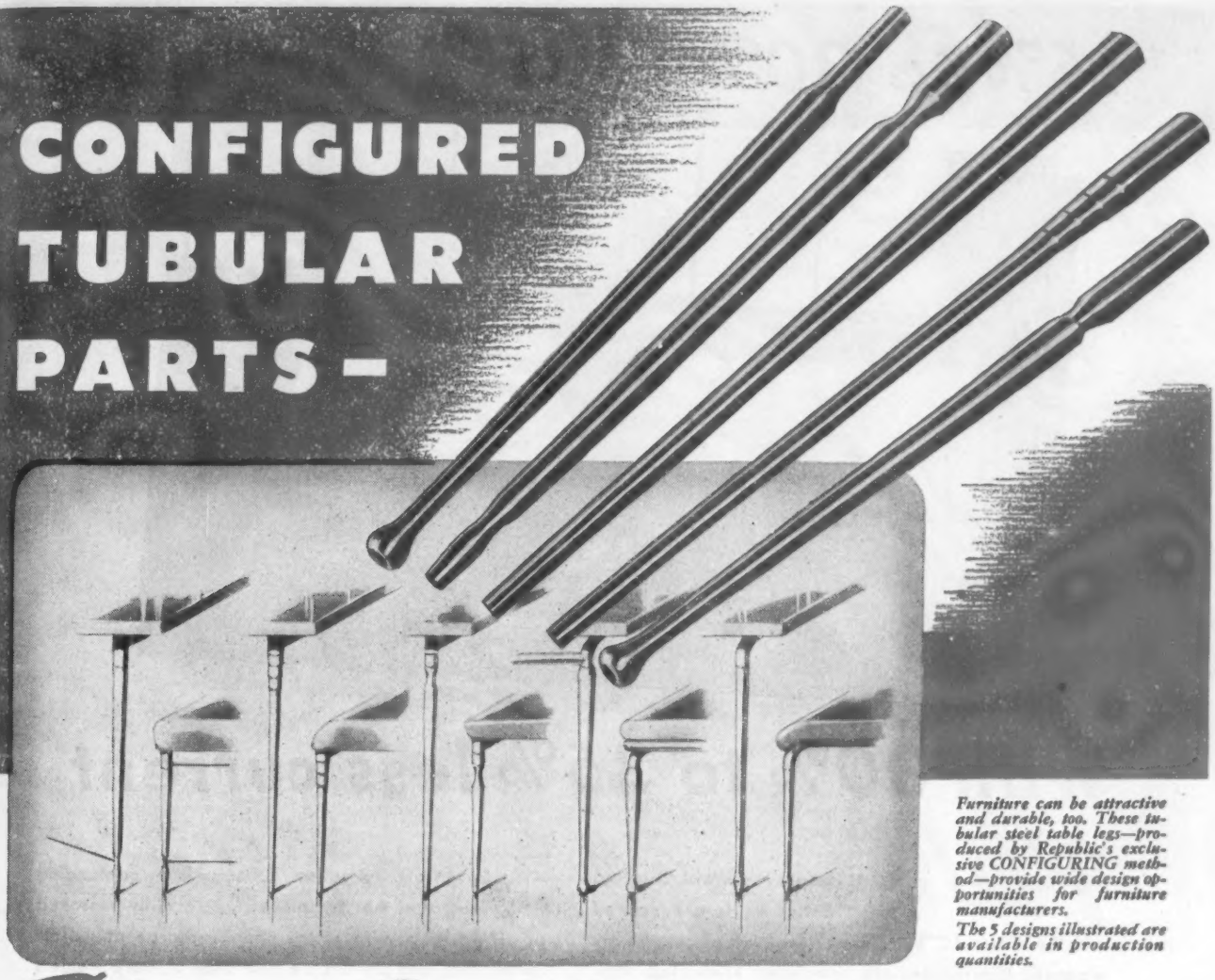
The Counting House of Industry

VEEDER-ROOT INC.

Hartford 2, Connecticut

In Canada: **Veeder-Root of Canada, Ltd., Montreal**
In England: **Veeder-Root Ltd. (New address on request)**

CONFIGURED TUBULAR PARTS—



Furniture can be attractive and durable, too. These tubular steel table legs—produced by Republic's exclusive CONFIGURING method—provide wide design opportunities for furniture manufacturers.

The 5 designs illustrated are available in production quantities.

Shaped Steel Tubing—OPENS NEW POSSIBILITIES TO PRODUCT DESIGNERS

A new development in tubing fabrication—CONFIGURATION—now makes it possible to incorporate unusual tubing shapes in your new product designs, *without involving prohibitive manufacturing costs.*

Produced by Republic's exclusive, patented process of cross rolling, round ELECTRUNITE Tubing can be Configured to many contours previously obtainable only on solid lathe-cut bars. Its limitations are sharp corners, sharp radii or undercuts, which cannot be formed by cross rolling.

With existing equipment, CONFIGURED TUBING is limited in size to lengths of 20 feet, with outside diameter up to 4″ and wall thickness up to .165″. Smallest finished size is ⅜″ O.D. by .035″ wall. This size range will be extended as new applications for this revolutionary tubing are uncovered.

For further details on CONFIGURED TUBING and its possible application to your present and anticipated products, write to:

REPUBLIC STEEL CORPORATION
STEEL AND TUBES DIVISION • CLEVELAND 8, OHIO
Export Department: Chrysler Bldg., New York 17, N. Y.

Republic
ELECTRUNITE TUBING

REG U S PAT OFF

Mechanical, Aircraft, Stainless Steel and Rail Steel Tubing—Boiler, Condenser and Heat Exchanger Tubes

15% to 30% FASTER WELDING

with 30% to 35% less current

PLUS

1 Improved Weld Quality. Better welds are assured with the Wilson AC "Bumblebee" Arc Welder because arc magnetic disturbances are completely eliminated. Thus, it is easier to control the molten pool, and produce sound, uniform welds—even in corners and tight spots.

2 Electrode Savings. By virtually eliminating "arc blow", the "Bumblebee" makes possible important savings through increased electrode deposition. Also a higher amperage can be used than is practical with DC welding. For this reason, the use of larger electrodes is possible, resulting in further important savings in stub ends.

3 Low Cost Operation. Economy is an outstanding feature of the "Bumblebee". Its greatly improved power factor eliminates the penalty charge of useless current lag, and permits the operation of more welders from existing feeders without causing an overload. Furthermore, savings on installation costs are assured through the use of smaller primary cables, line switches and fuses.

4 Low Maintenance. Low up-keep is virtually guaranteed with the "Bumblebee" because there are no rotating or moving parts except the cooling fan to wear, or require replacement.

Made in 200, 300, 500, 750 and 1000 ampere sizes, there is a Wilson "Bumblebee" to fit every need. Ask your nearest Airco office for catalog—or write Dept. S , Air Reduction, General Offices: 60 East 42nd Street, New York 17, N. Y. In Texas, Magnolia Airco Gas Products Co., General Offices: Houston 1, Texas. Represented Internationally by Airco Export Corporation.

AIR REDUCTION

OFFICES IN ALL PRINCIPAL CITIES AIRCO

WILSON

"Bumblebee"

A.C. **ARC WELDERS**

with the penetrating, stinging arc

A COMPLETE LINE OF A.C., D.C. AND GAS-ENGINE DRIVEN UNITS

. . . you will want copies of these books!

Bulletin UPA for the first time gives engineering data on a newly developed approach to power transmission. In this bulletin are shown compact Power Units. These "packages of power" assure absolutely correct mounting of gears, so essential to efficient operation, particularly when the gears are of high precision. Their design incorporates "A-Q" gears, described below.

Bulletin AQA gives complete engineering information on the design and application of "A-Q" (aircraft quality) gears. These new gears assure greater mechanical efficiency, longer life, lighter weight, more compact design and quieter operation.

These gears embody advance techniques in design and manufacture that permit operation at higher speeds and make possible loadings far in excess of values customarily considered safe design. By incorporating them in the machines you manufacture, your engineers may be able to solve difficult problems now confronting them—may be able to improve the performance of these machines and may be able to reduce over-all costs.

These books should be in the hands of every designing engineer or manufacturer interested in equipment requiring the transmission of power. Check the coupon and mail it today.

FOOTE BROS. GEAR AND MACHINE CORPORATION • 5225 South Western Blvd., Chicago 9, Ill.

FOOTE BROS.

Better Power Transmission Through Better Gears

Foote Bros. Gear and Machine Corp.
Dept. X, 5225 S. Western Blvd.
Chicago 9, Ill.

Gentlemen:
Please send me Bulletins checked below.

☐ Bulletin UPA on Foote Bros. Power Units
☐ Bulletin AQA on Aircraft Quality Gears

Name.....

Position.....

Firm.....

Address.....

City.....*State*.....

IN DECEMBER 1944 WE ANNOUNCED... IT'S

COMING
The New Crescent Electric
PALLETIER
For seven years, Crescent has been testing electric industrial fork truck design and construction features... in order to build not just another fork truck . . . but a truck offering advantages never before obtainable. The three models in the new Crescent Electric PALLETIER Line have been pre-tested . . . and they're on the way. The Crescent PALLETIERS will handle at peak efficiency 95% of all fork truck requirements. Every modern feature has been incorporated . . . including those developed as the result of broad experience in wartime materials handling.
Current production demands and limitation orders make it impossible to offer the PALLETIER for immediate delivery. But all three models of this truck will be available just as soon as large scale industrial reconversion begins.
CRESCENT TRUCK COMPANY
1100 Willow St., Lebanon, Pa.
Crescent
ELECTRIC TRUCKS and TRACTORS
Industrial Truck and Tractor Specialists for More Than 25 Years

Now—the New Crescent Electric

PALLETIER IS HERE!

ACTUAL production of the new Crescent Electric PALLETIER marks the completion of nearly eight years of meticulous research and experimentation, devoted exclusively to the development of a "super" industrial fork truck.

We've accomplished what we set out to do. The PALLETIER incorporates every desirable quality of modern fork trucks plus additional refinements and exclusive features. It offers you advantages never before obtainable.

The PALLETIER is *the* answer to your materials handling problem. It's *tomorrow's* industrial truck—*today*. Write for full details and specifications.

CRESCENT TRUCK CO., 1110 Willow St., Lebanon, Pa.

Crescent ELECTRIC TRUCKS AND TRACTORS

Industrial Truck and Tractor Specialists Since 1917

JET PROPULSION

Smoothness by Gisholt

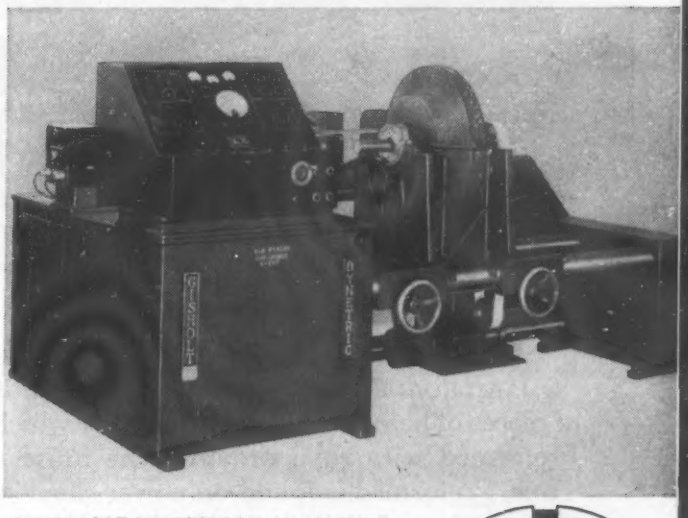
Heart of one jet propulsion engine is the 300 lb. impeller (air compression member) here shown mounted in a Gisholt Dynetric Balancer. The impeller must be freed from any trace of unbalance—for at jet engine speeds, the slightest vibration is disastrous!

GISHOLT DYNETRIC BALANCING MACHINES* do the job so well that these ultra-high speed rotors spin with an off-center displacement of *less than one ten-thousandth of an inch!*

Again Gisholt engineers fulfill their pledge to "balance anything that rotates" . . . from ½ ounce to 50 tons. *Freedom from unbalance vibration* means greater safety, less wear, better service—distinctly longer life!

Fast as it is accurate, Gisholt Dynetric Balancing actually cuts balancing costs. But get all the facts . . . write for full details!

**A development of Westinghouse Research Laboratories.*



GISHOLT DYNETRIC BALANCING MACHINES measure unbalance vibrations as small as .000025" at the bearings of the work piece. By simple dial readings, the amount and angular location of required corrections are determined in a matter of seconds.

GISHOLT MACHINE COMPANY
1217 East Washington Avenue • Madison 3, Wisconsin

GISHOLT

Look Ahead . . . Keep Ahead . . . With Gisholt

TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES • SPECIAL MACHINES

RAILROADS own and operate thousands of pieces of heavy-duty equipment for which Preformed wire rope provides the muscle. Thus, Preformed is found on power shovels, cranes, derricks, hoists, winches—on car pullers, car retarders, dumpers—on loaders, unloaders, slings.

Railroads—like other industries—choose Preformed because it is *economical*, *safe*, and *saves wear* on equipment.

Its *economy* comes from longer life, due chiefly to lack of internal stress. It is *safer* for workmen because its wires lie flat when cut or broken, and because preforming relaxes wire rope and makes it flexible . . . It *saves wear* on expensive equipment because it reduces rotation on sheaves and spools evenly on drums.

Executives in *all* industries recognize the better service offered by Preformed.

ASK YOUR OWN SUPPLIER FOR PREFORMED WIRE ROPE

CUT ALL 3 COSTS OF DELIVERING POWER

INITIAL INVESTMENT: Flat Leather Automatic Tension drive costs less — for belt, pivoted base and pulleys — than a comparable complete V-belt drive, except on the smaller sizes. And it costs less to install.

MAINTENANCE: F.L.A.T. drive automatically regulates belt tension, reducing wear on belt and bearings. Savings in belts, parts replacements and man-hours add up to a sizeable total.

COST OF DELIVERED POWER: F.L.A.T. drive is more economical because it delivers more power at rated load than a comparable V-belt drive . . . and its superiority becomes even greater above or below rated load and rated tension.

From the viewpoint of dollars, man-hours, units of production and elimination of down-time loss, the F.L.A.T. drive is the *lowest-priced* on the market!

Ask your Graton & Knight distributor for a demonstration.

"RESEARCH" LEATHER BELT saves money on a Flat Leather Automatic Tension drive . . . because it has longer life than a rubber V-belt on a comparable drive . . . requires fewer man-hours for maintenance . . . is guaranteed to increase average machine production by at least 3%.

Exclusive "weight-controlled" curry accurately controlling the proper amount of grease to provide pliability and high coefficient of friction . . . pre-stretching according to hide characteristics to remove initial non-elastic stretch and increase tensile strength . . . and patented "Tension-Cementing" — giving the most uniformly high ply adhesion strength ever obtained in belting . . . make "Research" your best buy for dependable and trouble-free service. Write for new, free Belting Manual — to Graton & Knight Company, 322 Franklin Street, Worcester 4, Mass.

GRATON AND KNIGHT

Research Leather Belting

from Graton & Knight's line of leather belting—the most complete for all applications. Graton & Knight distributors are listed under "Graton & Knight" in "Belting" section of Classified Telephone Directory and THOMAS' REGISTER.

MORE PRODUCTION PER MAN HOUR
These smaller size Niagara Inclinable Presses offer the same design features of larger Niagara Models. The instant acting 14-point sleeve clutch is an important factor in increasing the output per man hour. It is possible that one or more of these presses can help you in speeding up production of urgently needed material.
A1½
A1½
A1¾
A2
A2¼
A2½
NIAGARA
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NIAGARA
NIAGARA MACHINE & TOOL WORKS, BUFFALO 11, N. Y. • District Offices: New York, Cleveland, Detroit

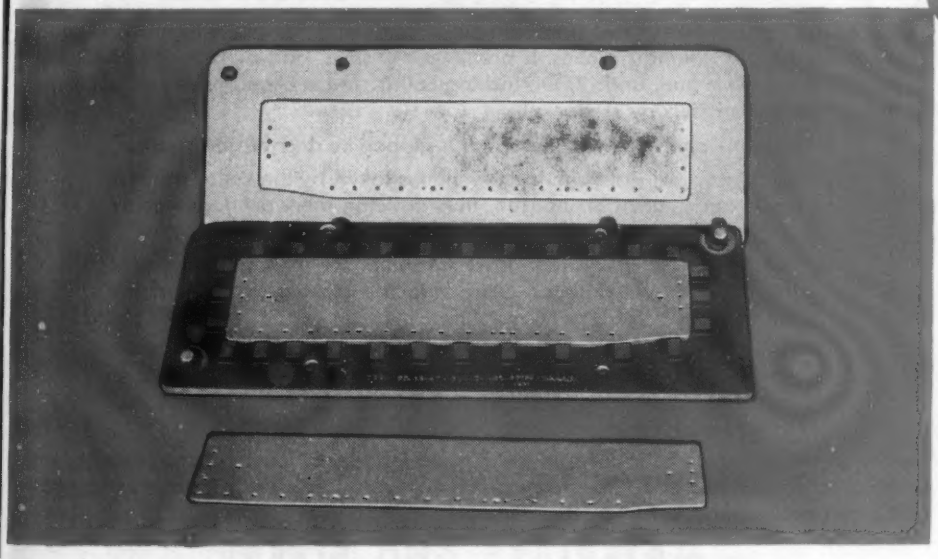
A PRODUCTION "Touchdown" EVERY TIME!

WITH ALGOMA TEMPLATE DIES

SPEED...SPEED...and MORE SPEED . . . that's what wins in football or in PRODUCTION TECHNIQUES. With Algoma Templates you get speed . . . you get into production in ½ the time—at ⅓ the cost. Fast . . . economical . . . production touchdowns are yours with Algoma Template Dies.

Let ALGOMA TEMPLATES show you the way to GREATER PROFITS with FASTER production changeovers.

Tell us . . . the metal . . .the gauge . . . the size of the run . . . we'll quote quickly.



For a Head Start, Be Wise—Specify Algoma Template Dies.

- ★ Blank Template Dies
- ★ End Blank Template Dies
- ★ Nest Pierce Template Dies
- ★ End Trim and Pierce Template Dies
- ★ Compound Template Dies
- ★ Progressive Template Dies

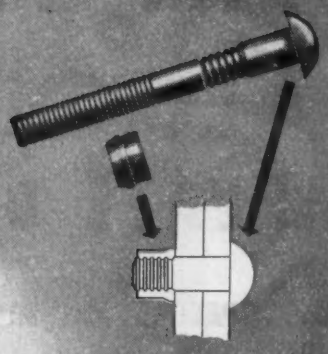
Algoma · PRODUCTS ·

3080 EAST OUTER DRIVE • DETROIT 12, MICHIGAN

NIAGARA MACHINE & TOOL WORKS, BUFFALO 11, N. Y. • District Offices: New York, Cleveland, Detroit

Announcing the Huck **LOCKBOLT** *...an*

ENTIRELY DIFFERENT Type of Fastener



The unique Huck Lockbolt combines the advantages of both bolts and rivets in one superior fastening. First it draws the work tightly together in the equivalent of a bolting-up operation as described below; then it is rigidly and permanently locked in place like a rivet. Note these features:

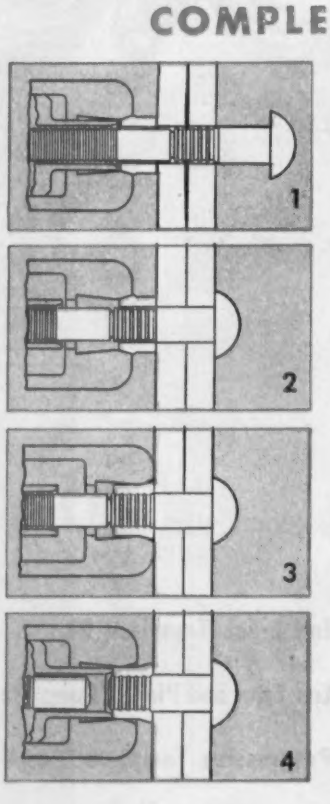
BETTER THAN A BOLT

- More quickly and easily installed.
- Fastens **permanently**; can't loosen under any conditions of vibration or fatigue loading.
- No lock washers, cotter pins or special nuts required.
- Fills the hole completely, yet allows liberal hole size tolerance.
- Uniform tightening assured.

BETTER THAN A RIVET

- Pulls work tightly together before locking.
- Stronger. High-strength alloy steel Huck Lockbolts have a much higher shear strength than conventional steel rivets. Lockbolts of aluminum alloy provide the strength of 24ST rivets without iceboxing. Tensile strength is comparable to that of bolts of the same material.

COMPLETELY NEW OPERATING PRINCIPLE



The Huck Lockbolt consists of two precision-made parts—(1) the pin, which has a head of any desired type, locking grooves, a breakneck groove, and pull grooves which fit the jaws of the driving gun; and (2) the locking collar. The sectional views at left show the driving operation step by step.

1. After the pin is inserted, the collar is slipped on and the gun applied.
2. As the gun pulls the pin, the reaction is taken by the collar against the swaging anvil of the gun, thus drawing the work together as in a bolting-up operation.
3. The pull on the pin is then increased until the anvil is forced over the collar, squeezing the collar into the locking grooves of the pin to form a rigid, permanent lock.
4. The pin is then automatically broken off at the breakneck groove; and finally, ejector member of gun advances to push the anvil off the collar. (Drawing 4 shows this push-off step more than half completed.)

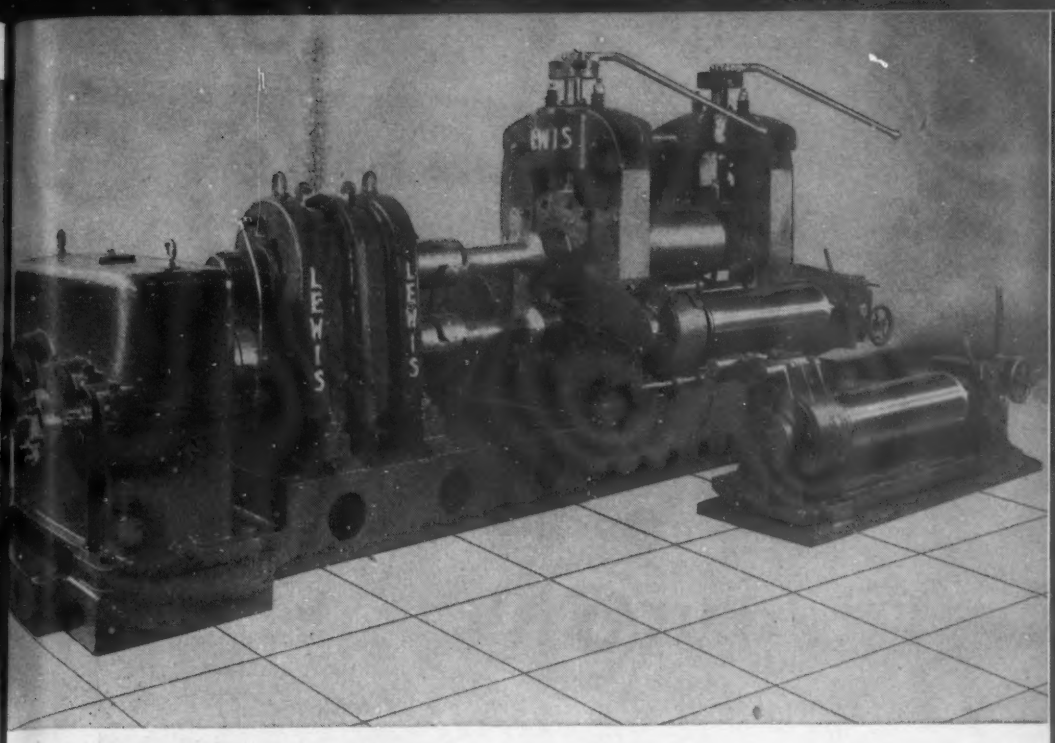
Two types of guns are available: The small hand gun, ideal for maintenance jobs, with which 6 to 10 Lockbolts can be driven per minute; and the faster, light-weight pneumatic gun recommended for production work.

MATERIALS AND SIZES

Huck Lockbolts can be furnished for both hole-filling and non-hole-filling applications, with heads of any type desired, and with pins of 24ST aluminum alloy, carbon steel, or high-strength alloy steel. Lockbolts are now available in 3/16" diameter with grip lengths ranging from 1/32" to 21/32". Lockbolts of 1/4" and 5/16" diameter will soon be available.

Consider how this radically DIFFERENT fastener can simplify YOUR assembly problems. Further information on request.

2480 BELLEVUE AVENUE *Huck* **MANUFACTURING CO.** **DETROIT 7, MICHIGAN**



PRECISION
PRECISION
PRECISION

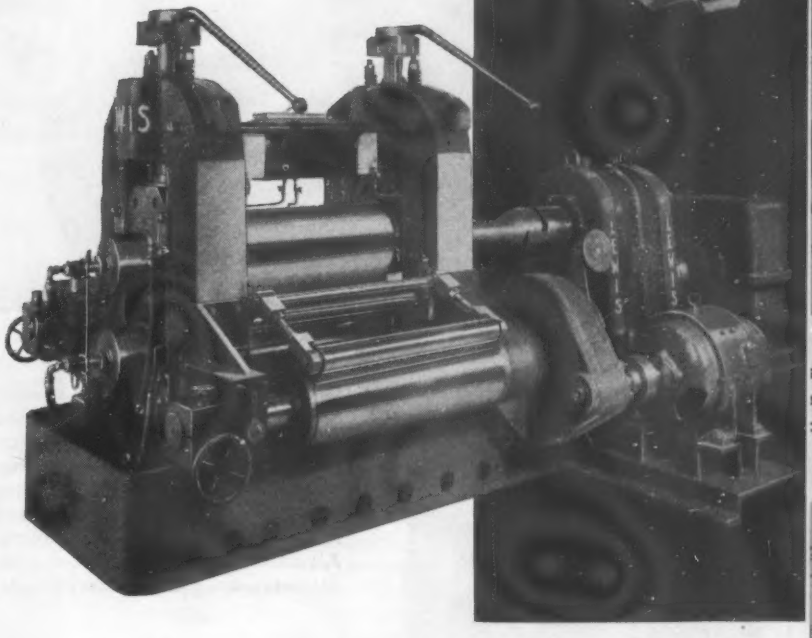
in manufacture is responsible for the unusually high output of

LEWIS FOIL MILLS

TWO-HI OR FOUR-HI

By working further back of the decimal point than is considered absolutely necessary, Lewis has provided foil producers with rolling equipment whose output can be figured in tons while its product is measured in thousandths of an inch.

An important feature of Lewis Foil Mills is the patented Automatic Tension Reel—adjustable to foils of any gauge... Write for complete data.



Top illustration . . . Lewis 13¼" x 34" Foil Mill showin view of wash pass. Unit Entering Side. Lower pho shows Leaving Side of similar mill.

LEWIS FOUNDRY & MACHINE

DIVISION OF BLAW-KNOX COMPANY, PITTSBURGH, PA.

...It's the magic of

Extrusion

...plus "know how" and careful supervision that assures you extra strength and safety in

CLEVELAND *Top Quality* FASTENERS

Cleveland Cap Screws and special headed and threaded parts are made by the Kaufman Double Extrusion Process, originated in our plant—a factor which adds extra strength to both full finished and high carbon heat treated products. All sizes—even including one inch diameter—are made by this process.

CLEVELAND *Top Quality* **FASTENERS**

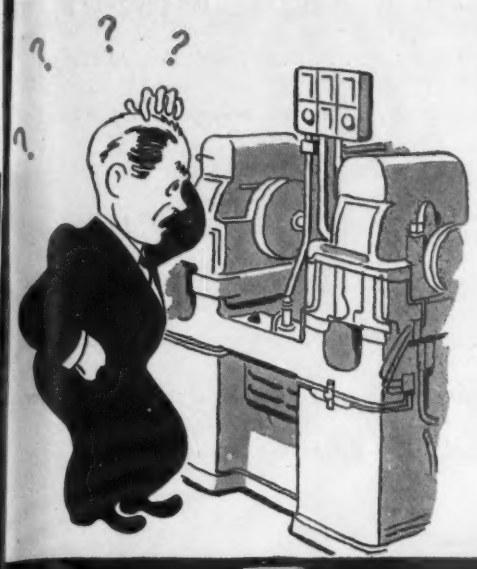
The Cleveland Cap Screw Company

2917 EAST 79TH STREET • CLEVELAND 4, OHIO

Warehouses: Chicago, Philadelphia, New York, Los Angeles

Ask your Jobber for Cleveland Fasteners

MADE BY THE ORIGINATORS OF THE KAUFMAN PROCESS FOR GREATER STRENGTH AND ACCURACY



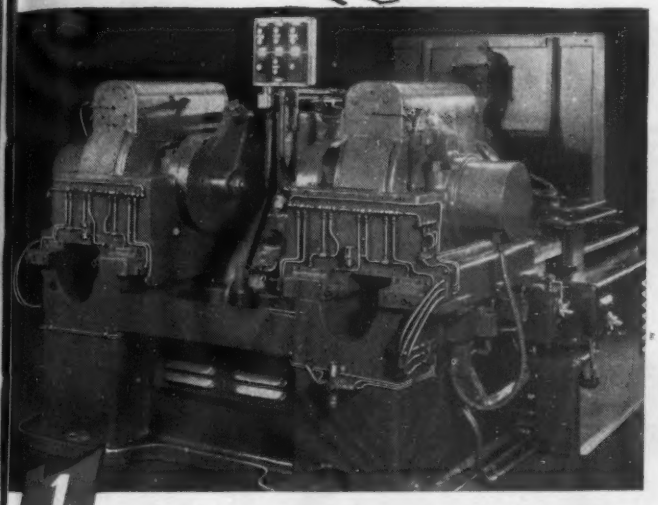
How to Add M.P.T.* to Your Machines

● Whether it's a case of meeting war production schedules *on time* or of preparing for peacetime production *in time*, you want the advantage of lower production costs. And one way to *get* that advantage is to add M. P. T.—*more productive time* per machine per day.

Alemite Centralized Lubrication Systems help add M. P. T. . . . because they not only assure *proper lubrication* but also permit machines to keep on producing *during lubrication.*

Thus, you add M. P. T. to your machines. Costs go *down* as production goes *up!*

**More Productive Time*

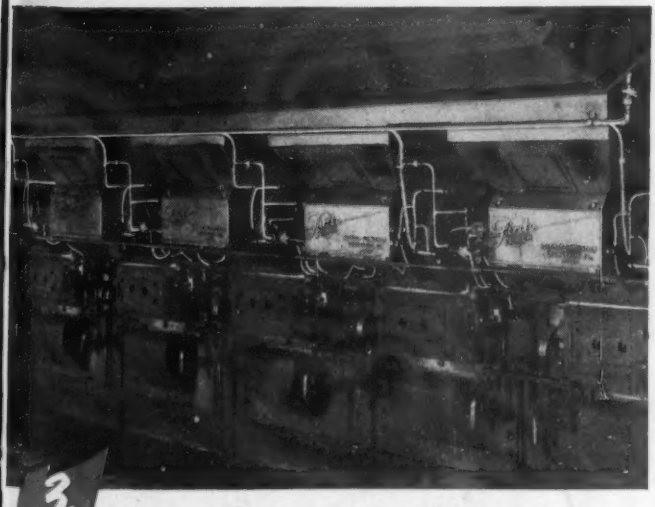


1.

Alemite Dual Progressive *Centralized* Lubrication System—Lubricates all bearings from one central point—delivering a metered quantity of grease or oil to remote bearings *without stopping the machine.* Can be operated with permanently mounted lubricating pump or any type of pressure gun operated manually or by power. Easy to install.

2.

Alemite Dual-Manifold *Centralized* Lubrication System—A full hydraulic operated system for large groups of medium and heavy duty machines. Ideal for handling a wide range of lubricants from light oils to heavy greases under extremes of heat and cold. Delivers pre-determined amount of lubricant to bearings from one central point *without stopping the machines.*



3.

Alemite LubroMeter *Centralized* Lubrication System—Designed for manual or automatic operation on large or small machines. A single lubricant line conveys oil or grease from central supply to hydraulically operated measuring valves which replace oil cups, pressure gun fittings and grease cups. Machines need *not* be stopped for lubrication.

See These Alemite Systems Work . . . Right at Your Desk

Have an Alemite Specialist demonstrate Centralized Lubrication Systems with working models you can examine, study and work right at your desk. He will give complete technical information about adaptation of Alemite Systems to your machines. No obligation. Write Alemite, 1879 Diversey Parkway, Chicago 14, Illinois. In Canada: Belleville, Ontario.

ALEMITE

First in Modern Lubrication

Another Product of STEWART WARNER

CONSULTATION • ENGINEERING • EQUIPMENT
LUBRICANTS • MAINTENANCE

New high-solids lacquer . . .

The new high-solids lacquers can give twice the covering power of old-style lacquers . . . enable operators to complete more pieces in a given time . . . because they provide far thicker coatings when dried. Each coat now does the work of two! The answer is more solids, less solvent. Yet, despite the new finishing speeds and economies afforded, their durability and appearance are not sacrificed. For production line finishes on metal, wood, fabric, glass, rubber, leather, paper, plastics—use high-solids lacquers and save!

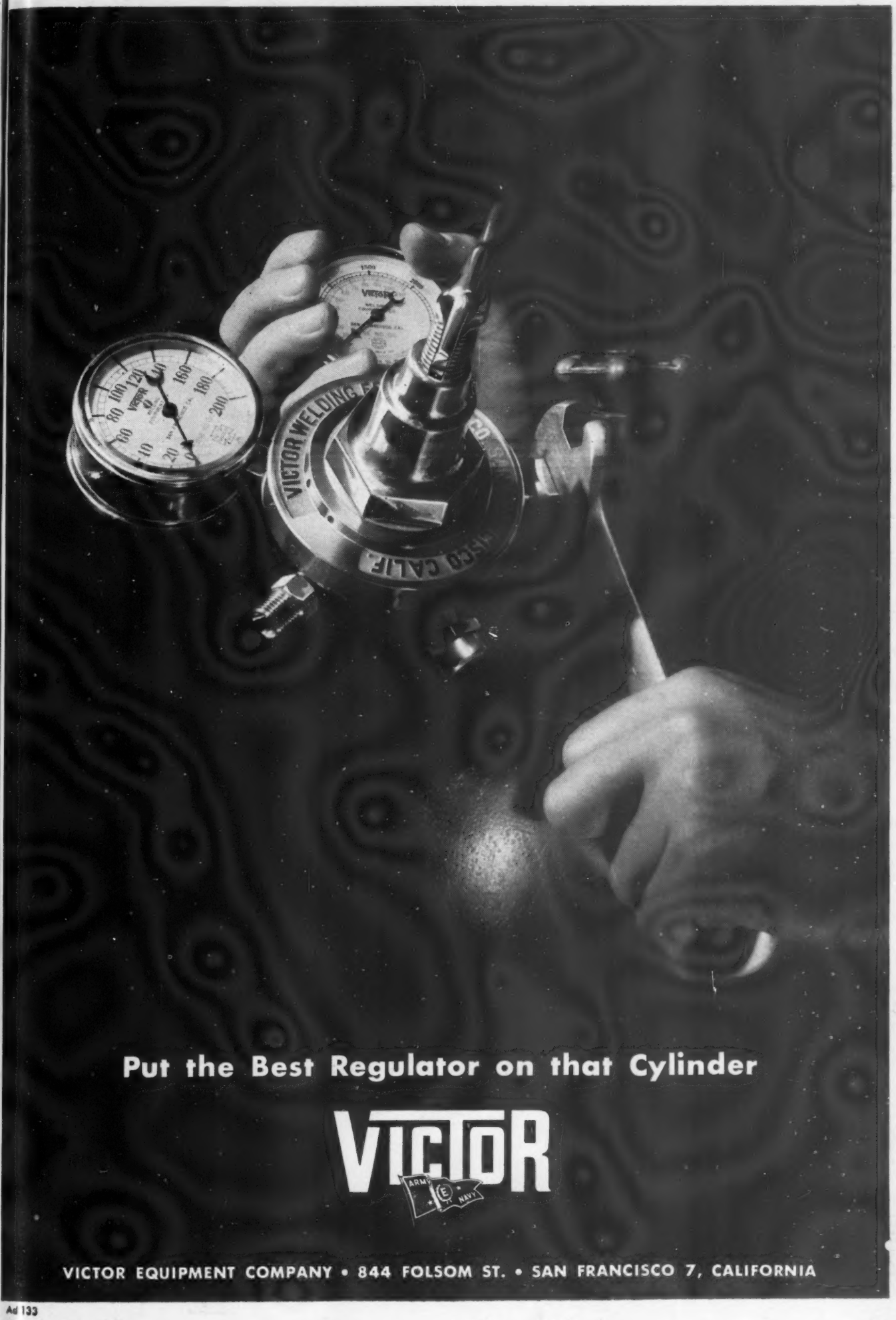
LIKE GIVING EACH SPRAY OPERATOR TWO GUNS

ASK YOUR LACQUER SUPPLIER for complete details and application data on these new time-and-money-saving lacquers, as they become available. Hercules does not make high-solids lacquers, but concentrates on the production of the highest quality nitrocellulose from which they are made.

CL-53A

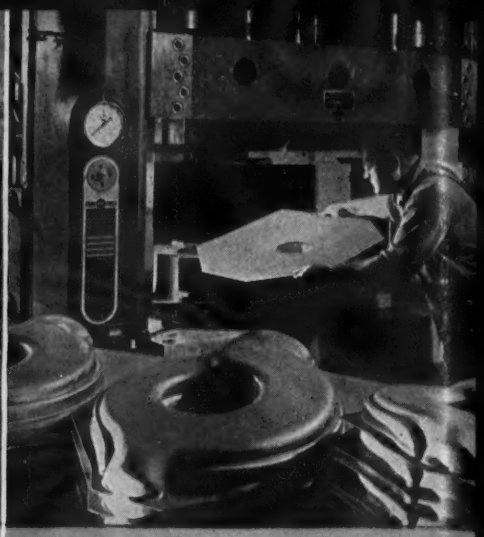
HERCULES

Cellulose Products Department
HERCULES POWDER COMPANY
INCORPORATED
930 Market St., Wilmington 99, Del.


VICTOR WELDING
Put the Best Regulator on that Cylinder
VICTOR
ARMY NAVY
VICTOR EQUIPMENT COMPANY • 844 FOLSOM ST. • SAN FRANCISCO 7, CALIFORNIA

FORGING H-P-M presses for flat and closed die forging are revolutionizing the forging industry.

FORMING H-P-M presses are ideally suited for forming heavy metal parts.



DRAWING H-P-M presses are the production standard for deep sheet metal drawing.

THE H-P-M *All-Hydraulic* PRESS ...Industry's Most Versatile Production Machine For PRESSURE PROCESSING

Most products, regardless of their nature, require the application of pressure in their manufacture. In these industries, H-P-M self-contained hydraulic presses are revolutionizing production technique. Deeper draws, less rejects, fewer operations, better grain structure, more even density, faster production and less maintenance are natural results of applying modern H-P-M hydraulics to pressure processing problems. All of these worthwhile features result in *lowering manufacturing* costs.

For 68 years, The Hydraulic Press Mfg. Company's activities have been devoted exclusively to the production of hydraulic presses. This specialized effort has resulted in the most versatile line of all-hydraulic press equipment ever offered for pressure processing. H-P-M is the only builder of completely integrated presses, with press frame, pumps, valves and controls all built by a single organization. Investigate H-P-M presses for your pressure processing work. H-P-M engineers will be glad to discuss your production problems. Write today, stating your requirements.

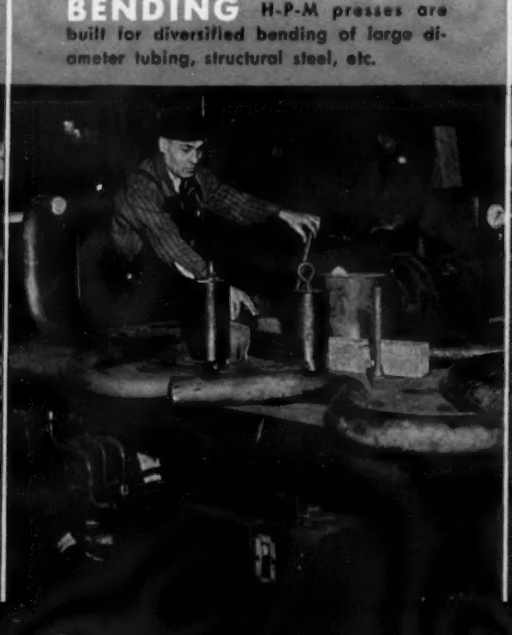
THE HYDRAULIC PRESS MFG. COMPANY

Mount Gilead, Ohio, U.S.A.

Branch Offices in New York, Philadelphia, Cleveland, Detroit and Chicago.
Representatives in other principal cities.

DIE CASTING H-P-M high pressure metal die casting machines are of revolutionary all-hydraulic design.

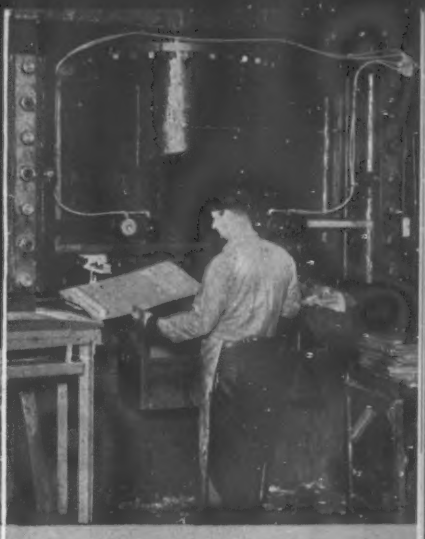
BENDING H-P-M presses are built for diversified bending of large diameter tubing, structural steel, etc.



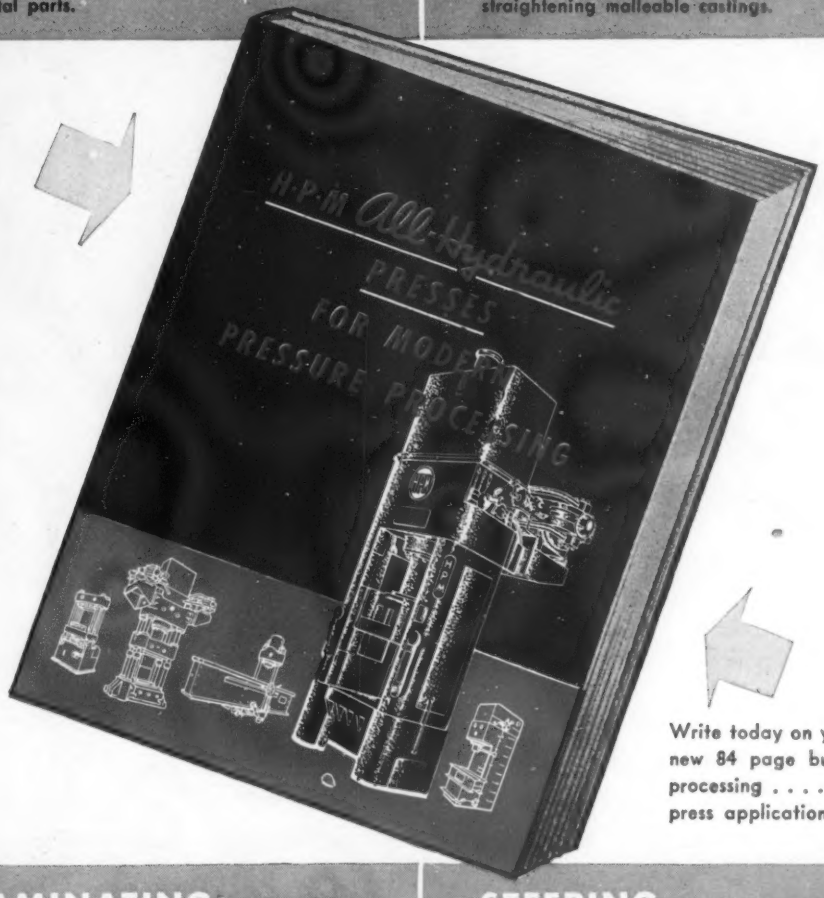
PLASTICS MOLDING H-P-M builds a complete line of plastics molding presses – injection, compression, etc.

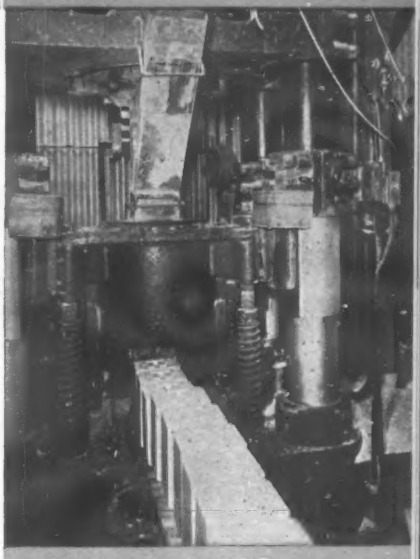
COINING H-P-M presses are used extensively for coining and sizing metal parts.

STRAIGHTENING H-P-M presses are universally accepted for die straightening malleable castings.



EMBOSSING H-P-M presses provide the answer to mass production metal embossing problems.

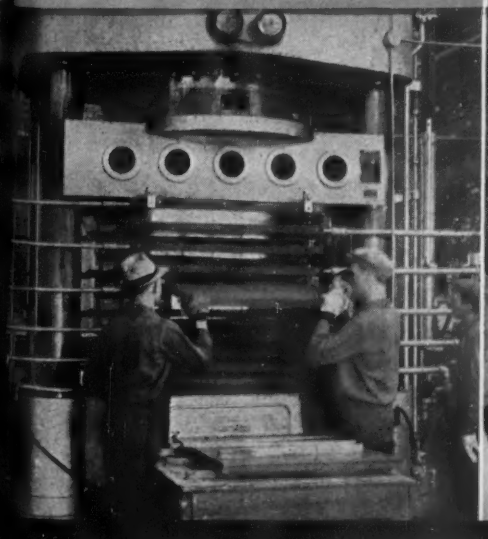




BRIQUETTING H-P-M presses briquette many materials — salt, carbon ceramics, metal powder, etc.

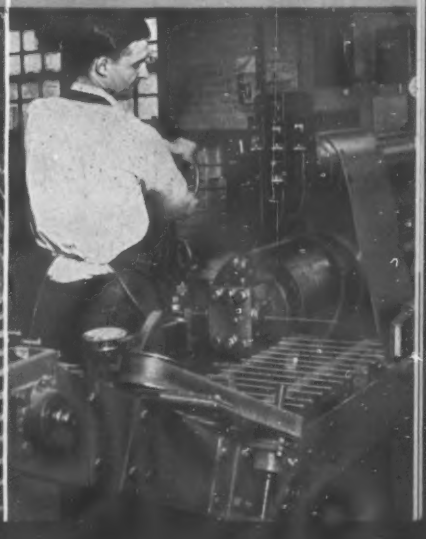
Write today on your company letterhead for your free copy of H-P-M's new 84 page bulletin describing "All-Hydraulic" presses for pressure processing . . . . an informative textbook concerning modern hydraulic press applications for peacetime production.

LAMINATING H-P-M presses laminate many types of plastic impregnated materials.



STEEPING H-P-M presses are employed by leading producers of viscose rayon and cellophane.

EXTRUDING H-P-M extruding presses are used principally to coat welding electrodes.



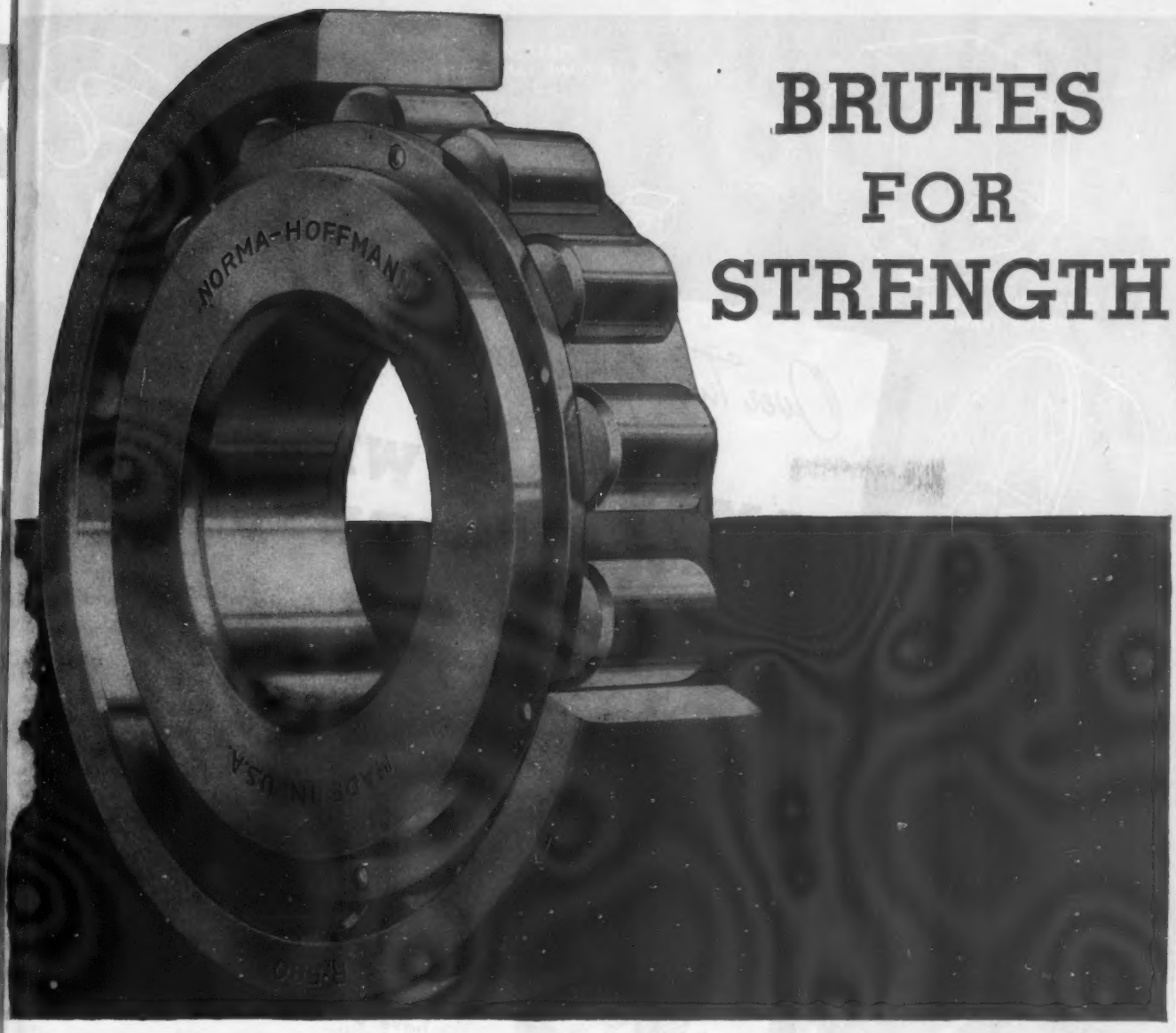
More than a dozen points of attachment are provided by this Alcoa Aluminum forging. Its use avoids high labor costs and manufacturing hazards, entailed in building up a part for the same task. A maximum saving in weight is achieved.

All of the usual advantages gained with Alcoa Aluminum are retained—strength, lightness, corrosion resistance and dependability.

Intricate parts, surprisingly large in size, are possible in Alcoa Aluminum forgings. Alcoa engineers, skilled in their design and production, will gladly assist in adapting aluminum forgings to your products. ALUMINUM COMPANY OF AMERICA, 2112 Gulf Building, Pittsburgh 19, Pennsylvania.

ALCOA FIRST IN ALUMINUM

ALCOA REG. T. M. ALUMINUM



BRUTES FOR STRENGTH

THE outstanding performance records made by NORMA-HOFFMANN PRECISION ROLLER BEARINGS under the heaviest and most exacting duties, are the logical result of the following distinctive factors:

Full line contact of rolling surfaces, affording a larger radial load capacity for continuous and intermittent service than any other type of single-row bearing, and providing a temporary overload capacity 50% above normal catalog rating, with greater resistance to shock and vibration.

Highly durable, completely machined and balanced bronze retainer riding on inner ring shoulders and minimizing internal load.

Lower frictional coefficient under heavy loads than any other single-row anti-friction bearing—due to extreme precision and design characteristics.

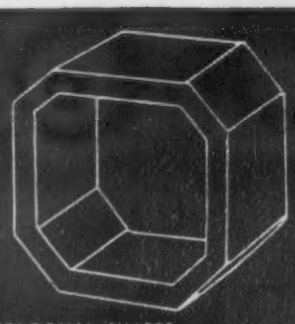
Test these PRECISION ROLLER BEARINGS in your own hardest service; remember that they have all the high speed qualities of the best ball bearings, and are interchangeable, size for size, with all single-row metric ball bearings.

Write for the catalog. Let our engineers work with you.

"NORMA-HOFFMANN"

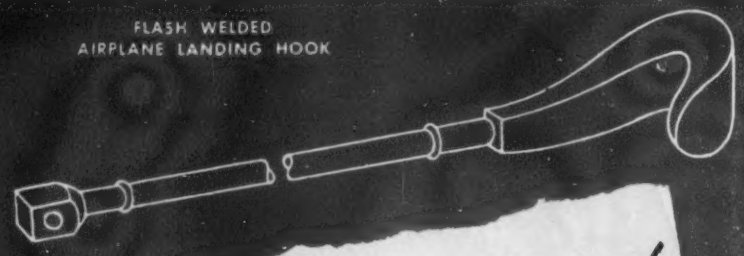
PRECISION BALL, ROLLER and THRUST BEARINGS

NORMA-HOFFMANN BEARINGS CORPN., STAMFORD, CONN. U.S.A.



OCTAGONAL SHAPED
MOTOR FRAME

FLASH WELDED
AIRPLANE LANDING HOOK



Over Twenty-five years experience behind

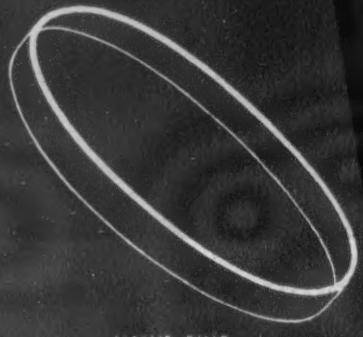
AMERICAN WELDING WELDMENTS

Shown here are just a few of the more simple weldments produced by us that have resulted in better products and lower manufacturing costs.

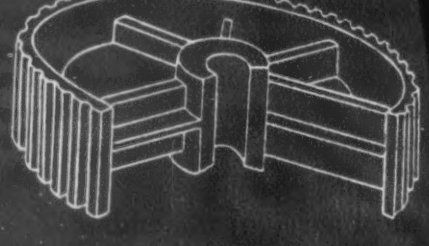
We have pioneered the "fabrication by welding" process. We have the equipment, resourcefulness, ability and desire to handle any job that has heretofore seemed impossible by this means of fabrication. Production of the simplest flash welded rings to the most complicated weldments requiring many parts and all types of welding are within our scope.

Our representative may be able to uncover some hidden possibilities relative to your fabrication problems. Why not have a talk with him — no obligation of course.

FABRICATED WHEELS

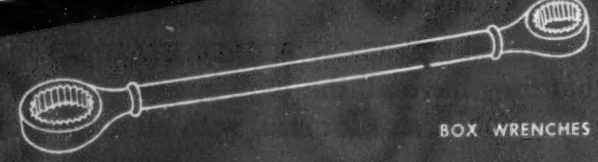


VALVE RING



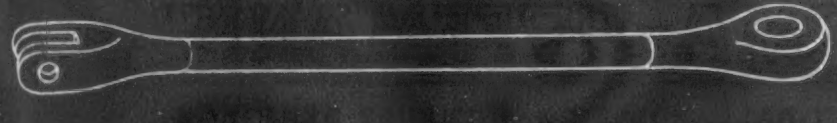
BULL GEAR WELDMENT

THE AMERICAN WELDING & MANUFACTURING CO. · WARREN, OHIO



BOX WRENCHES

CLEVIS FLASH WELDED TO BAR AND EYE



STEEL PRODUCTS FABRICATED BY FLASH BUTT OR ARC WELDING... RINGS, BANDS, AND RING ASSEMBLIES

"We heard voices over our shoulders!"

As we built up the family of INCO Nickel Alloys, it was as though voices of future users were telling us which properties to incorporate.

Almost *everybody,* it seemed, wanted strength, toughness, and hardness, combined with corrosion resistance. (*And, with Nickel as the base, this was easy.*)

Then, individual voices were heard asking for *specialized* properties, in addition to these *group* properties.

Different users wanted: . . . a metal with longer life at high heat . . . a corrosion-resistant metal, heat treatable to the strength and hardness of heat-treated steel . . . a high-strength, non-magnetic metal . . . a rustless, fatigue-resisting, spring metal . . . and, *even,* the paradoxical combination of hardness and toughness with high-speed machinability.

Today, all — *and more* — of these demands are being met with the INCO Nickel Alloys.

When selecting metals for "tough" jobs, do *you* get *all* the properties you need? Or is your choice usually a compromise? There's less need for compromises with the INCO Nickel Alloys available. *Just refer to the 8 different "property-combinations" they offer!*

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

PROPERTY:	MONEL	"R" MONEL	"K" MONEL	"KR" MONEL	"S" MONEL	NICKEL	"Z" NICKEL	INCONEL
CORROSION RESISTANCE	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH
STRENGTH	GOOD	GOOD	HIGH	HIGH	GOOD	GOOD	HIGH	GOOD
TOUGHNESS	GOOD	GOOD	HIGH	GOOD	GOOD	HIGH	HIGH	HIGH
HARDNESS	GOOD	GOOD	GOOD	GOOD	HIGH	FAIR	HIGH	GOOD
MACHINABILITY	GOOD	HIGH	GOOD	HIGH	GOOD	GOOD	GOOD	GOOD
NON-GALLING	NO	NO	NO	NO	HIGH	NO	NO	NO
SPRING PROPERTIES	GOOD	NO	HIGH	NO	NO	GOOD	HIGH	HIGH
ELEC. CONDUCTIVITY	POOR	POOR	POOR	POOR	POOR	GOOD	GOOD	POOR
HEAT RESISTANCE	GOOD	GOOD	GOOD	GOOD	HIGH	GOOD	GOOD	HIGH
HEAT TREATABLE	NO	NO	YES	YES	YES	NO	YES	NO
NON MAGNETIC	NO	NO	YES	YES	YES	NO	NO	YES

MORE INFORMATION? — Tell us the alloy that interests you, and we'll mail more information. Or, send for "List B-100", listing over 100 bulletins which explain the properties and applications of the INCO Nickel Alloys.

NICKEL INCO TRADE MARK **ALLOYS**

MONEL • "K" MONEL • "S" MONEL • "R" MONEL • "KR" MONEL • INCONEL • "Z" NICKEL • NICKEL • Sheet . . Strip . . . Rod . . Tubing . . . Wire . . . Castings . . . Welding Rods (Gas & Electric)

fire your questions about

NITRALLOY*

*HARDEST STEEL SURFACE KNOWN

NITRALLOY ENGINEERS

have the answers...

- ✔ Core hardness?
- ✔ Machinability?
- ✔ Case histories?
- ✔ Chemical analysis?
- ✔ Fatigue resistance?
- ✔ Withstand high temperatures?
- ✔ OK for gears? for dies?

Nitralloy is *hard,* with an approximate Vickers-Brinell value of 900 to 1100. There are thousands of possibilities for this alloy in peacetime products, as there were in war. Nitralloy engineers make your investigation of those possibilities *easy.*

The Nitralloy Engineering Department invites any inquiry about the characteristics of this alloy. Nitralloy can increase the fatigue- and wear-resistance of your product. Nitralloy engineers are prepared to tell you, for instance, of the performance of Nitrided Nitralloy parts in the engines of the famous B-17's, or in the mechanism of typewriters, or in Diesel fuel pumps — to report from hundreds of case-histories and files of technical data already assembled, or to initiate new research. Whatever your questions regarding Nitralloy—*the hardest steel surface known*—Nitralloy Engineers are prepared to offer a prompt and comprehensive answer, or to aid you in determining an answer. Feel free to send Nitralloy the most general query — or the most detailed.

Or, if you would like first a broad introduction to Nitralloy and the process by which it is made, write for the free booklet, NITRALLOY AND THE NITRIDING PROCESS.

538

THE NITRALLOY CORPORATION
230 PARK AVENUE
NEW YORK 17, N. Y.

Companies Licensed by The Nitralloy Corporation

Allegheny Ludlum Steel Corp.	Watervliet, N. Y.
The Babcock & Wilcox Tube Co.	Beaver Falls, Pa.
Bethlehem Steel Co.	Bethlehem, Pa.
Carnegie-Illinois Steel Corp.	Chicago, Ill.
Copperweld Steel Co.	Warren, O.
Crucible Steel Co. of America	New York, N. Y.
Firth-Sterling Steel Co.	McKeesport, Pa.
Republic Steel Corporation	Cleveland, O.
The Timken Roller Bearing Co.	Canton, O.
Rotary Electric Steel Co.	Detroit, Mich.
Vanadium-Alloys Steel Co.	Pittsburgh, Pa.
Atlas Steel Limited	Welland, Ontario

Operating & Accredited Nitriding Agents

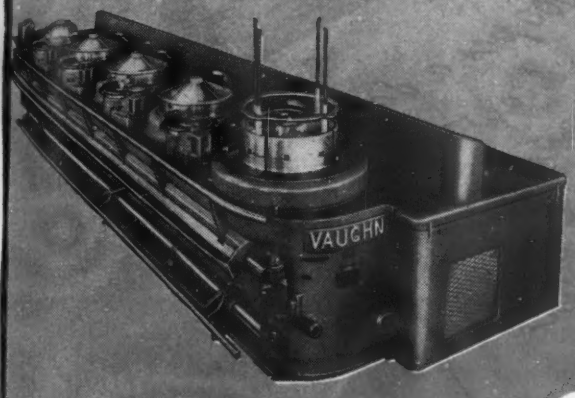
Commercial Steel Treating Corp.	Detroit, Mich.
Englehard & Kenny	North Arlington, N. J.
The Lakeside Steel Improvement Co.	Cleveland, O.
Lindberg Steel Treating Co.	Chicago, Ill.
Link-Belt Co.	Philadelphia, Pa.
Met-Lab, Inc.	Philadelphia, Pa.
New England Metallurgical Corp.	Boston, Mass.
Pittsburgh Commercial Heat Treating Co.	Pittsburgh, Pa.
Queen City Steel Treating Co.	Cincinnati, O.
Rex & Erb	Lansdale, Pa.
The Sulkover Metal Processing Co., Inc.	Long Island City, N. Y.
Wesley Steel Treating Co.	Milwaukee, Wis.
N. A. Woodworth Co.	Ferndale, Mich.
Ontario Research Foundation	Toronto, Ontario, Can.

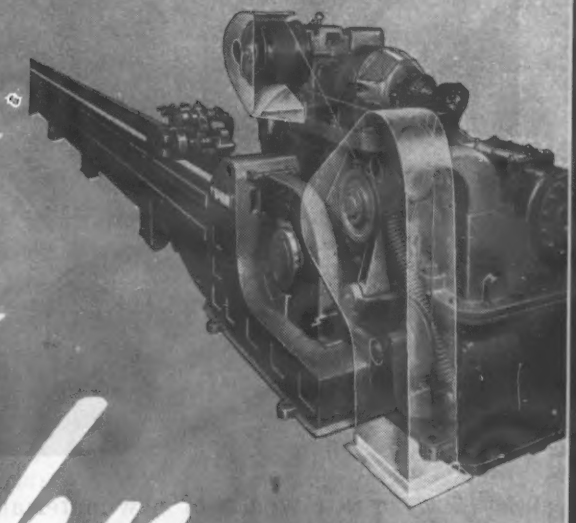
Manufacturers of Nitralloy Steel Castings

Milwaukee Steel Foundry Div., Grede Foundries, Inc.	Milwaukee, Wis.

Warehouse & Stock

A. Milne & Co.	New York, N. Y.
Joseph T. Ryerson & Son, Inc.	Chicago, Ill.
Edgcomb Steel Company	Philadelphia, Pa.

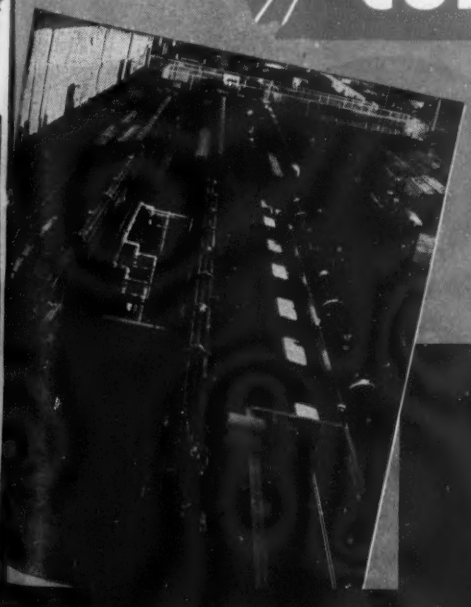




IT'S *Vaughn* FOR

V in your COLD DRAWING EQUIPMENT

- SPEED with • SAFETY
- STRENGTH with • FLEXIBILITY
- VERSATILITY with • DURABILITY

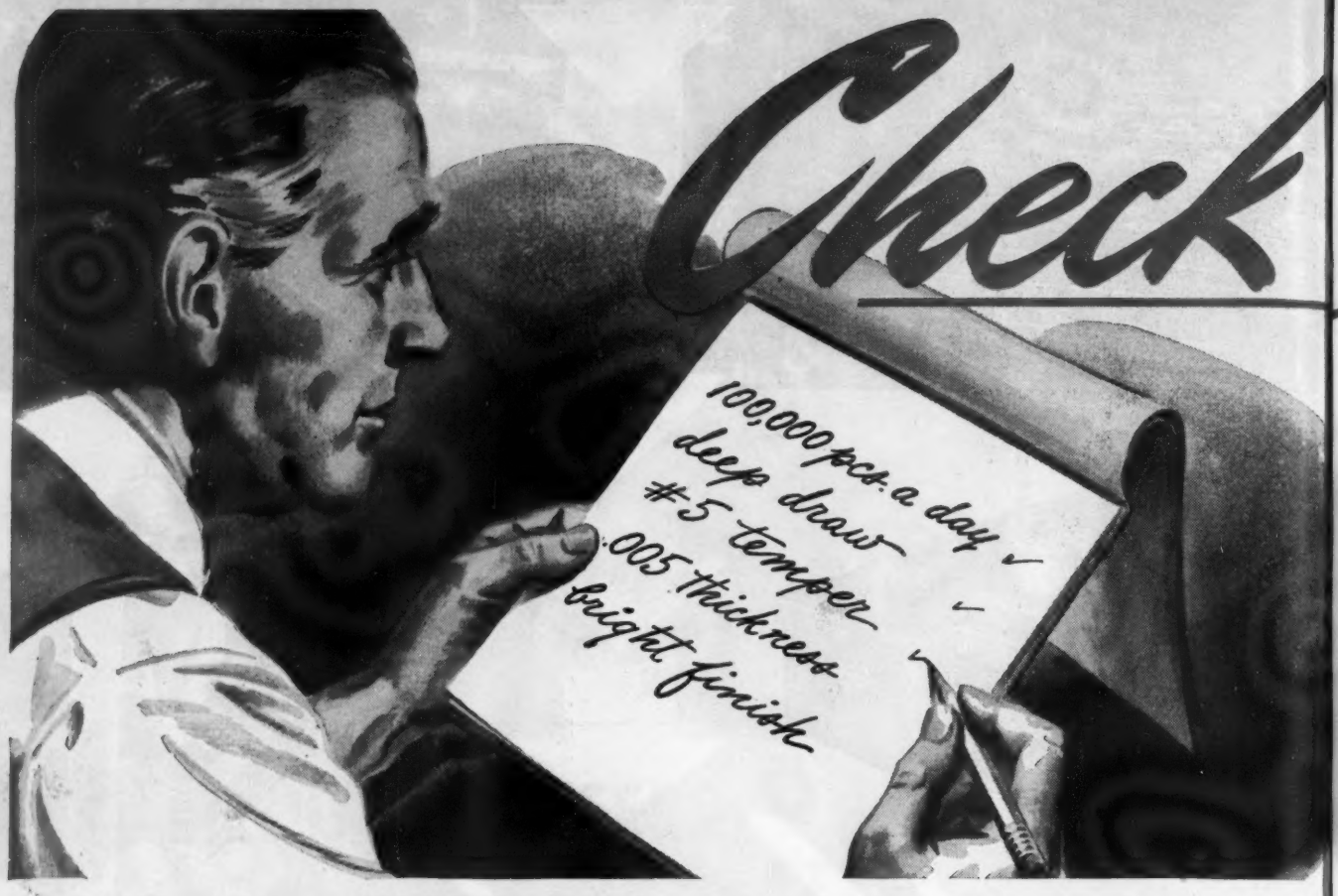


Every quality essential to the profitable manufacture of cold drawn products is present in Vaughn Machinery—designed and built for high performance, smooth operation, long service life. • Specify VAUGHN—and take a long step forward in your reconversion program!

THE VAUGHN MACHINERY COMPANY

CUYAHOGA FALLS, OHIO

COMPLETE COLD DRAWING EQUIPMENT . . . Continuous or Single Hole . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys.



IN A WORLD of new materials and new processes we sometimes lose sight of the "proved-in-service" advantages which are found in the more familiar materials and methods. Roebling Strip Steel, for instance, has been used successfully for many years in the production of an endless variety of fabricated shapes, from simple stampings to intricate deep drawn parts. It is especially suited to volume production on automatic machines where smoother, steadier punching, drawing or forming operations save man hours and production time.

The *time-tested* quality of all Roebling steels is your assurance that even the most exacting requirements will be satisfactorily met. Let a Roebling engineer show you how this versatile material can increase profits in your fabricating operations.

JOHN A. ROEBLING'S SONS COMPANY
TRENTON 2, NEW JERSEY
Branches and Warehouses in Principal Cities

WIRE ROPE AND STRAND • FITTINGS • SLINGS
COLD ROLLED STRIP • AERIAL WIRE ROPE SYSTEMS
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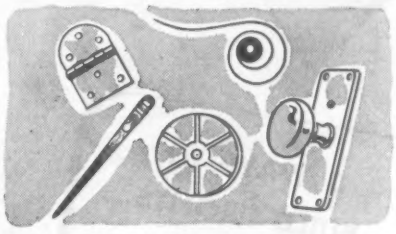
AND LOW CARBON ACID AND BASIC OPEN
HEARTH STEELS • ELECTRICAL WIRES AND CABLES
AIRCORD, SWAGED TERMINALS AND ASSEMBLIES

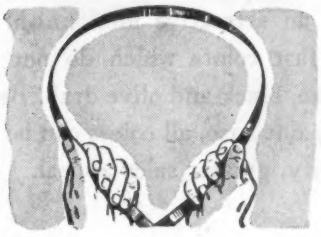
ROEBLING STRIP STEEL

AGAINST YOUR FABRICATING NEEDS

Research and Testing Roebling Strip Steel is backed by more than a century of experience in making products of top quality steels. In our Research Laboratories Roebling Engineers are constantly striving to improve materials and perfect new methods and techniques of manufacture. New developments are thoroughly tested for performance under every stress and strain and the resulting improvements are passed along to our customers in the form of better products.

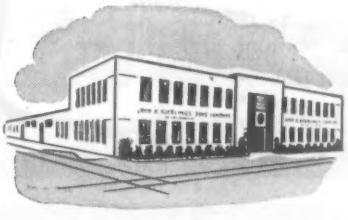


Sizes and Forms Roebling Strip Steel and Flat Wire is available in widths up to 10"; as thin as .002"; either high or low carbon, hard rolled, annealed or tempered. Bright coppered, hot, electro galvanized or tinned finishes. Steel is shipped in coils or straightened and cut.



Made to Specifications The manufacture of Roebling Strip Steel and Flat Wire is primarily a custom operation. It is made to fit the individual needs of the customer. Requirements for temper, edge, finish, size, hardness and other physical properties are met with consistent uniformity. Roebling specializes in the production of strip steel and has facilities for handling a complete range of specifications.

Distribution For our customers' convenience, Roebling branch offices and warehouses are located at key points throughout the country. Speedy deliveries help to keep your production lines rolling and operating costs down. Experienced engineers are always available for prompt, courteous service on your every requirement.



BLING

IN WIRE PRODUCTS

Adds Sales Appeal to Galvanized Sheets, Products, Parts

IRIDITE Shuts Out Corrosion, Provides Firm Paint Base, too

HERE is a new quick-dip process that opens up vast new fields of use for galvanized sheets, products and parts. Iridite not only balks corrosion, but holds paint or clear lacquer firmly, even on newly galvanized surfaces. Tests by several paint companies show that Iridite keeps zinc from fouling the paint . . . prevents formation of the soapy, chalky, underlying film that destroys adhesion. Galvanized products that have been Iridited take paint readily . . . hold it permanently.

3 WAYS TO BUILD PROFITS WITH IRIDITE

1 ***As a final finish,*** Iridite is available in a variety of attractive colors.

2 ***As a paint base,*** Iridite holds paint firmly, even on newly galvanized surfaces.

3 ***To reduce costs,*** consider using galvanized, plus Iridite, in place of more expensive metals.

Variety of Colors

For many uses, Iridite serves as an attractive final finish. It is available in a large selection of fast colors which do not vary. Included are blue, green, red, bronze, black and olive drab. Because of Iridite's excellent qualities as a paint base, all colors can be clear-lacquered for even greater durability, greater sales appeal.

Puts Crimp In Corrosion

Send for free test panel and see for yourself how Iridite bans corrosion on zinc die cast, zinc or cadmium plated or galvanized surfaces. Iridite goes on with a quick dip of 15 to 60 seconds, is dried in a few seconds, permits immediate handling and shipping. Send for your test panel today. Write Rheem Research Products, Inc., 14210 Standard Oil Building, St. Paul and Franklin Sts., Baltimore 2, Md.

Test IRIDITE Yourself

RHEEM RESEARCH PRODUCTS, INC.
14210 Standard Oil Building
Baltimore 2, Maryland

Gentlemen: Please send me a free panel of Iridite-treated zinc plate for laboratory testing and full information and operating details.

Name.....

Company.....

Address.....

Mail Coupon for FREE Test Panel!

RHEEM RESEARCH PRODUCTS, INC.

IRIDITE

Standard Oil Bldg., Baltimore 2, Md.

Reg. U. S. Pat. Office

Branches—570 Lexington Ave., New York 22; 20 E. Jackson Blvd., Chicago 4; 9411 Siebel St., Los Angeles 31. Distributors in: Waterbury; Grand Rapids, Detroit; Cleveland; Los Angeles; Long Island City; St. Louis.

Two single words best describe every bar of Wyckoff Steel—PRECISION PLUS.

Precision, because every step of manufacturing is under constant laboratory-type control to provide uniform high quality.

Plus, because of the wide technical knowledge and top "steelmaker's" skill found in the entire Wyckoff organization.

Wyckoff engineers will be glad to apply these *Precision-Plus* qualities to your post war production problems.

Constant Grain Structure

Eliminates Costly Processing

Rigidly Controlled Properties

Higher Strength Values

Maximum Machinability—Always

WYCKOFF STEEL COMPANY

First National Bank Building, Pittsburgh 30, Pa.
3200 S. Kedzie Avenue, Chicago 23, Illinois

Manufacturers of Carbon and Alloy Steels — Turned and Polished Shafting — Turned and Ground Shafting — Wide Flats up to 12" x 2".

Works at
AMBRIDGE, PA.
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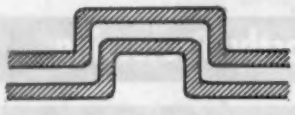


Diagram of positioning buttons formed on the flanges. The punch side was made larger than the die side so that the metal would not pierce.

Redesign for Stamping Cuts Housing Weight in Half

Castings formerly used for these counting device housings weighed 3 lbs. 4 oz. each. The stamped redesign is only about half of this weight. The whole job could not be stamped, so a screw machine part was attached to one half through a "D" hole. To permit assembly of an oil cup, this same half had a hole pierced in it and was then extruded to permit assembly of an oil cup. This method saved making the parts of a heavy gauge material throughout. The design was also worked out so that one set of tools made both halves. This is another example of a stamping user saving money through Presteel ingenuity. We invite you to talk over your problems of design or production with our engineers or representatives.

WORCESTER PRESSED STEEL CO.

510 Barber Avenue, Worcester 6, Mass.

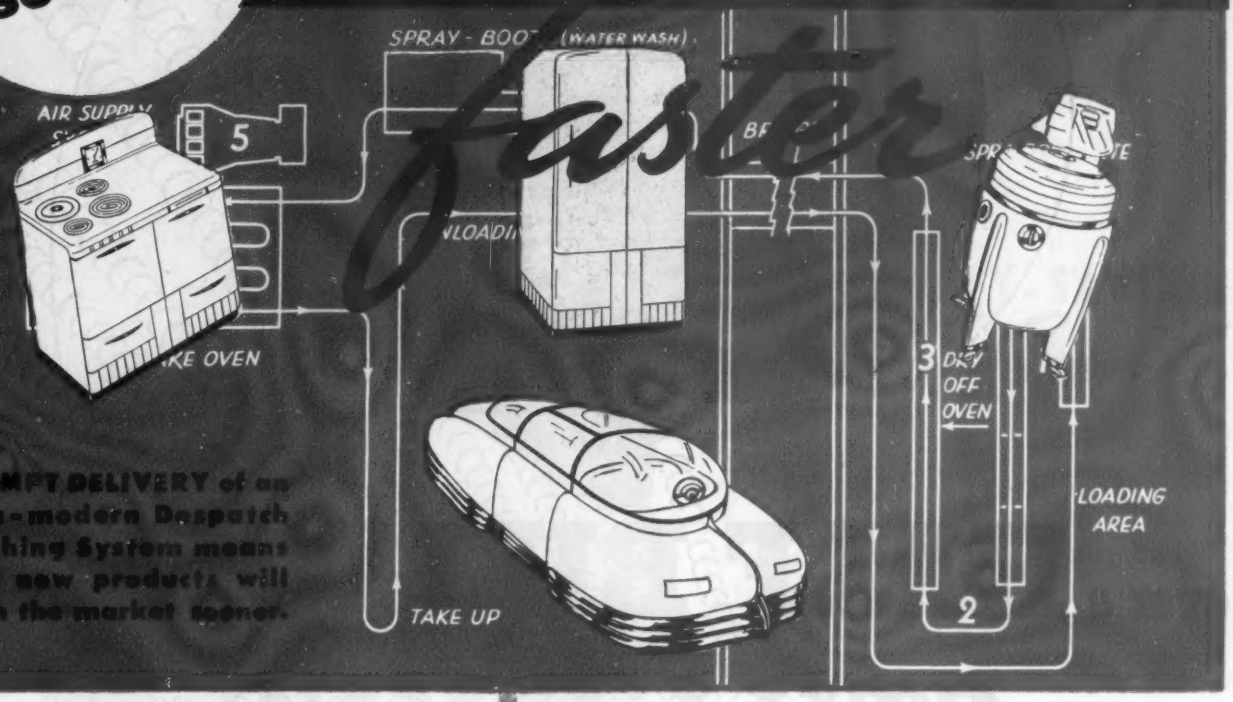
ALLOY STEELS AND OTHER METALS COLD FASHIONED SINCE 1883

Representatives in Alexandria Virginia, Buffalo, Canton Ohio, Chicago, Denver, Detroit, Fort Worth, Indianapolis, Los Angeles, New York, Philadelphia, Syracuse, Toronto

You can get a complete

DESPATCH FINISHING SYSTEM

Get into production sooner!



PROMPT DELIVERY of an ultra-modern Despatch Finishing System means your new products will reach the market sooner.

HERE'S WHY!

Here are the reasons why Despatch, despite the terrific rush of reconversion, can still assure you of prompt delivery of urgently needed Finishing System equipment:

Largest Engineering Staff. Despatch's staff of picked engineering specialists is believed to be largest in the industry! Over 110 engineers from coast-to-coast, and two large field offices, *plus* scores of assisting personnel.

Ample Production Facilities. One of the biggest and most modern plants in the industry. Over 50,000 sq. ft. of manufacturing floor space, adequate stocks, tools, latest machinery, improved manufacturing methods. Gets all jobs out fast!

Prompt Installation Service—Finishing System equipment is installed *immediately* after delivery by experienced Despatch installation engineers. Saves time and guarantees correct assembly, coordination and adjustment.

Plenty of Experienced "Know How"—Sound, usable knowledge from 43 years specialized experience! Reduces delay, reveals sound shortcuts and gets equipment to your plant *faster!*

You'll save weeks or even months—of costly delay through *prompt delivery* of a Despatch Finishing System . . . and you'll get into production that much sooner. No priorities, no tedious unnecessary waiting. Yet you get newest mechanized equipment, correctly engineered for high speed, competitive peacetime finishing.

Take advantage of this unusual service! You'll save time . . . get easier handling . . . improved quality . . . more output . . . and lower finishing costs!

COMPLETE SYSTEMS OR SEPARATE ITEMS

FINISH BAKING OVENS of all types. 100% mechanized.

DRYERS, efficient, economical, for various operations.

SPRAY BOOTHS of types and sizes to suit all needs.

SPRA-BONDERIZERS, multiple stage units.

AIR CONDITIONERS of latest design.

CONVEYORS to speed handling, cut finishing costs.

SEND THIS COUPON TODAY

DESPATCH OVEN COMPANY
619 S. E. 8 Street, Minneapolis 14, Minn.
221 N. LaSalle, Chicago 1, Ill.

Yes! We're interested in PROMPT DELIVERY of Finishing System equipment, such as:

☐ BAKING OVENS ☐ BONDERIZING UNITS
☐ DRYERS ☐ AIR CONDITIONERS
☐ CONVEYORS ☐ SPRAY BOOTHS
☐ Have your engineers survey our plant and recommend equipment for finishing such products as_____

Name_____ Title_____

Company_____

Address_____
(STREET) (CITY) (ZONE) (STATE)

DESPATCH OVEN COMPANY MINNEAPOLIS 14 CHICAGO 1

over a HALF BILLION "cookies" ....and STILL GOING

with these Diecarb dies

The original die, at the latest count, had produced the unprecedented total of over a half billion stampings, and was still going!

SEVERAL years ago, in a Pittsburgh electrical manufacturing plant, a disc or "cookie" die was placed in operation. It was made of Diecarb, Firth-Sterling's newest, original, sintered carbide development for blanking dies. This "cookie" die blanked a circle of silicon electrical sheet .025 inch thick, to be used in rotors and stators.

It proved so successful that since then two other similar Diecarb dies have been put to work—all averaging *50 to 60 million* blanks per grind, as compared with 90,000 pieces per grind with high speed steel dies.

In fact, the life of these remarkable Diecarb dies is not yet determined because all dies so far made are still in use.

Diecarb can be used for blanking and forming a diversity of materials including metals, plastics, paper, etc. It operates successfully on thicknesses up to 7/16 inch. It is proving unmatchable for high production operations, saving both downtime and maintenance.

If you have a product that requires blanking or if you are planning one—call in Firth-Sterling now to test the possibilities of Diecarb.

GET IN TOUCH WITH US

A complete Diecarb engineering service is at your call—for designing complete dies; for aiding in application of Diecarb to die shoes by brazing; shrink-fitting; press fitting and mechanical matrix; and for proper grinding.

Firth-Sterling
STEEL COMPANY

OFFICES: McKEESPORT, PA. • NEW YORK • HARTFORD • PHILADELPHIA
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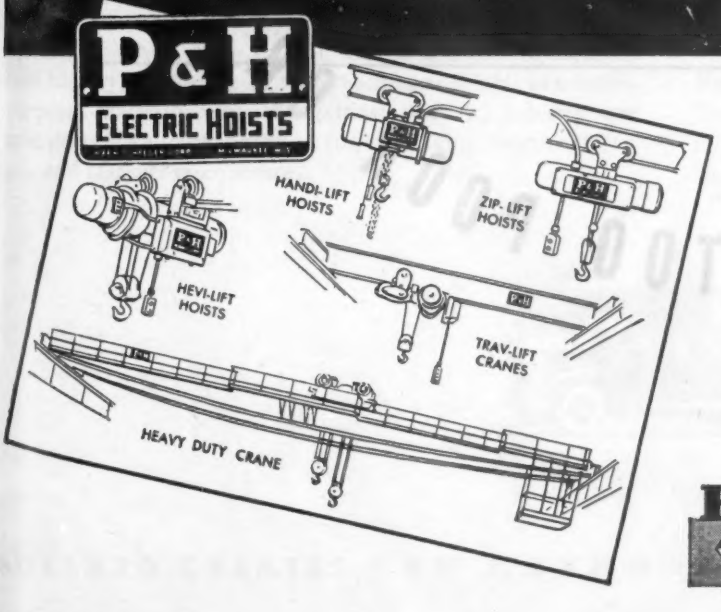
P&H
ZIP-LIFT
HARNISCHFEGER CORP. MILWAUKEE, WIS.

Can MONEY-SAVING START *Too Soon?*

• Why put off the savings of "thru-the-air" materials handling? Now's the time to turn over your heavy lifting jobs to electricity . . . and release skilled hands for productive work.

With P&H Zip-Lift Hoists, materials move without rehandling. From raw to finished state, they're carried, lifted, lowered and placed — all with the pushing of buttons! Furthermore, these modern, wire-rope hoists keep aisles free of congestion, a big step in increasing plant efficiency.

The day you install P&H Zip-Lifts is the day you begin saving time and money — making profits on moving as well as from manufacturing. Why delay? Let a P&H Hoist Engineer look over your handling needs . . . or write us for Bulletin H20-2.



General Offices: 4411 W. National Avenue
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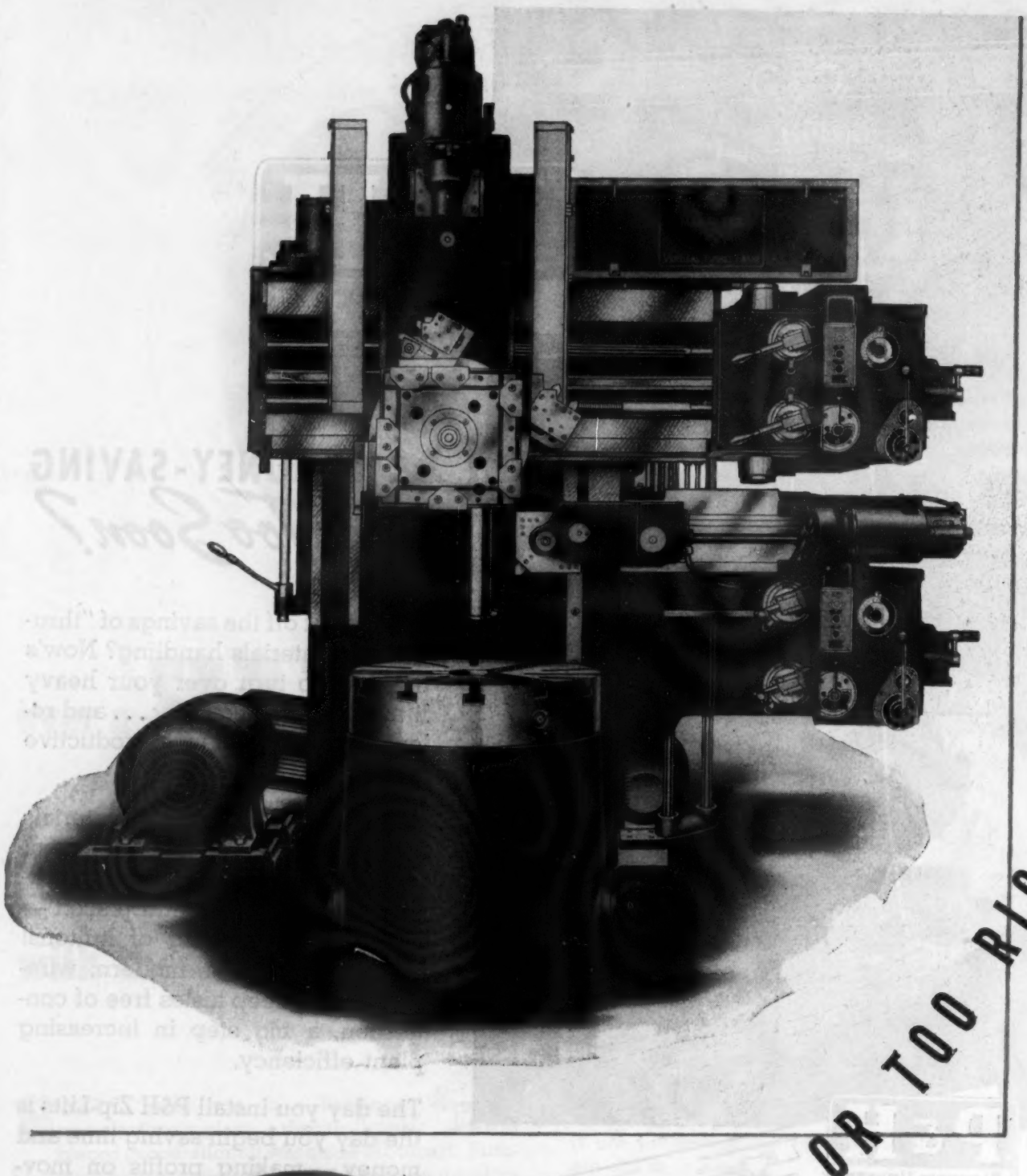
CORPORATION
HOISTS • WELDING ELECTRODES • MOTORS P&H EXCAVATORS • ELECTRIC CRANES • ARC WELDERS

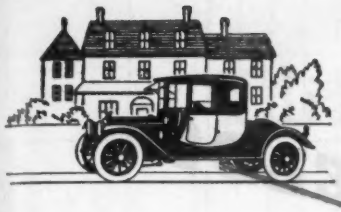


BULLARD

MAN-AU-TROL

MASTER OF THE MACHINE

TOO POOR OR TOO RICH



IS USUALLY A MATTER OF PRICE

Only the rich rode in automobiles in 1910

Even the poor were riding in 1940

Yet most of the poor were no "richer"

Permitting more people to enjoy what Industry has created is the essence of America's high standard of living. It has come about *partly* because their wages have been increased . . . *mostly* because prices have been reduced to meet their wage levels.

You can easily verify that. Records show that, during the years of the greatest advance in American living standards, the cost of goods *decreased* by a greater percentage then wages *increased*. That more people had more things to enjoy was less a matter of having more money to spend than of goods costing less to buy.

And how were the costs of goods lowered?

By more efficient manufacturing methods . . . by the same means that can be employed by Industry . . . by you . . . as America resumes its peacetime economy.

Making machines do more is the essence of efficient production. That is why Industry is welcoming the Bullard Man-Au-Trol principle of Automaticity as enthusiastically *today* as manufacturers in the past have greeted every other outstanding Bullard manufacturing method. Man-Au-Trol, for the first time in machine tool history, makes an automatic machine as flexible as a multi-purpose, manually-operated machine. With it, Industry can take great price-lowering strides toward making the poor richer . . . and markets more secure.

HOW THE BULLARD MAN-AU-TROL VERTICAL TURRET LATHE LOWERS UNIT PRODUCTION COSTS

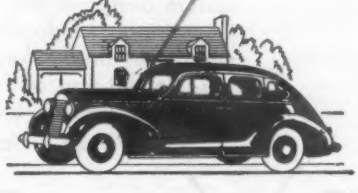
1. LIGHTENS LABOR'S LOAD: The operator goes once through the machining cycle manually, setting the best production method into an automatic cycle. Then he merely loads, supervises and unloads while the Man-Au-Trol does the work.

2. MAKES AUTOMATICITY VERSATILE: It automatically machines any and all work which the Vertical Turret Lathe can handle when operated manually. Is instantly convertible for manual operation on the same piece or an entirely different piece without affecting the automatic cycle for which it is set.

3. SAVES SET-UP TIME: Unlike so many other automatic machines, its set-up time from one class of work to another is only slightly more than a manually-operated machine.

4. REDUCES SALVAGE COSTS: It machines day after day with a degree of accuracy impossible under manual operation because it eliminates human and cumulative error.

For additional facts about the way the new Bullard Man-Au-Trol Vertical Turret Lathes minimize tool investment, reduce machining time and other manufacturing costs, write for Bulletin A—today. The Bullard Company, Bridgeport 2, Conn.



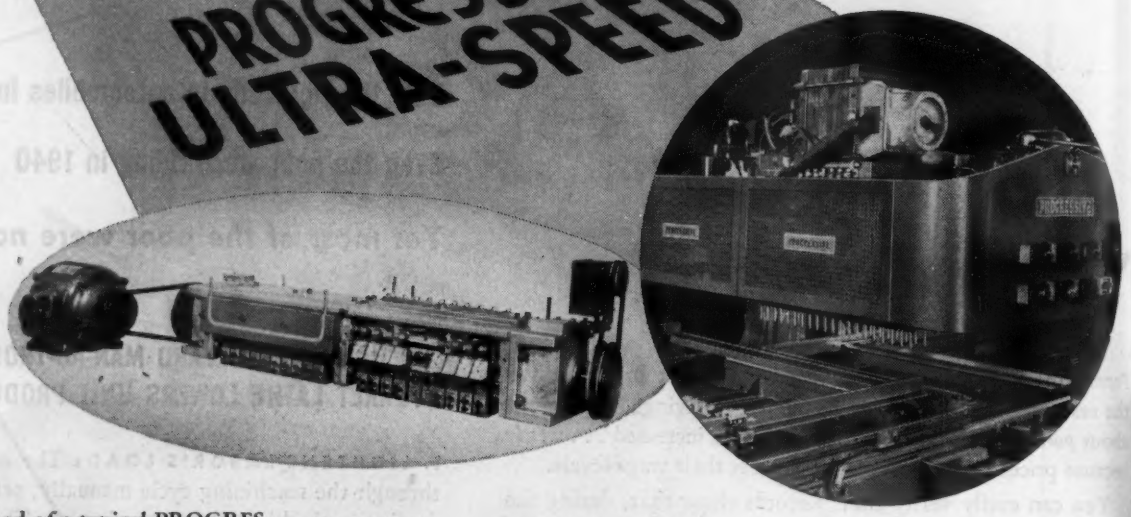
BULLARD CREATES *NEW METHODS* TO MAKE MACHINES DO MORE

20 SPOTS
40 SPOTS
60 SPOTS
OR MORE

IF YOUR ASSEMBLY NEEDS THAT MANY WELDS

it's a job for a

PROGRESSIVE ULTRA-SPEED



Above, right: Head of a typical PROGRESSIVE Ultra-Speed on a machine designed to weld a series of double rows of 40 spots in a large panel assembly. (Automatic indexing to 1/1000 inch; high speed "approach" to welding position; automatic cycle.)

Above: Heart of PROGRESSIVE Ultra-Speeds is this control unit with many exclusive PROGRESSIVE features.

Typical Applications for the Progressive Ultra-Speed

AUTOMOTIVE

Floor-pans Rear Decks Doors Frames Roof Assemblies Windshield Openings

REFRIGERATOR

Doors Panels Trays

STOVES

Panels Doors

With the Progressive Ultra-Speed you weld the spots automatically at almost unbelievable rates—welding speeds up to 900 spots per minute are possible.

The welding guns apply the pressure on the work all at the same time, thus clamping it firmly in proper position before welding. They remain in contact after welding, thus eliminating sparking at electrodes.

The Progressive Ultra-Speed is versatile and you can projection weld as well as spot on the same job, using the type of welding best suited to each location or metal thickness.

Electrodes can be arranged in circles, rows, curves, stepped, etc.

NOTE: PROGRESSIVE Ultra-Speed machines are custom designed and built to order for the specific job, using standardized sub-assemblies to reduce initial cost and increase salvage value. We will be glad to tell you about the many exclusive features of the PROGRESSIVE Ultra-Speed.

Write us for further information

IT PAYS TO WELD

PROGRESSIVE Welder Co. 3050 E. OUTER DRIVE • DETROIT 12

RESISTANCE WELDING EQUIPMENT

Eliminate

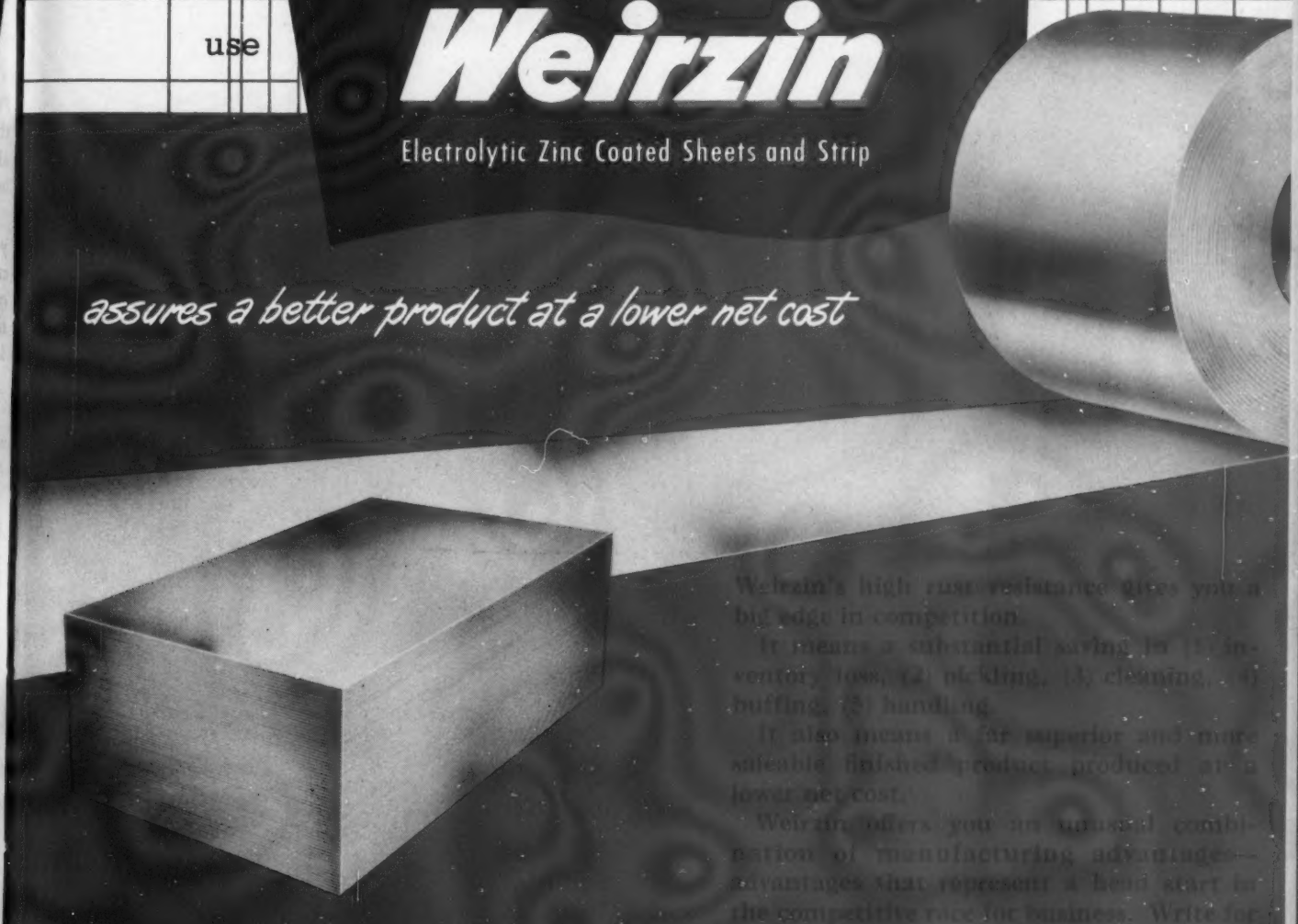
inventory loss

due to rust

use **Weirzin**

Electrolytic Zinc Coated Sheets and Strip

assures a better product at a lower net cost



WEIRTON STEEL CO.

WEIRTON STEEL COMPANY

A NATIONAL STEEL CORPORATION

OURS IS A SMALL WORLD

Ours is a small world — not because our work demands small tolerances, or because we are limited to the precision machining of metals. It is small because there are only a few who understand and need our kind of work.

Those who do understand, however, have learned to depend on us for the mass-production of small, hard-to-make, *interchangeable* components and assemblies, *vital* to their products.

Why not restudy your own assembly requirements? You may find that you need precision parts which Nichols could produce in volume — *at prices aimed to meet competition*. You see, we'd like to increase the size of your world, and ours too.

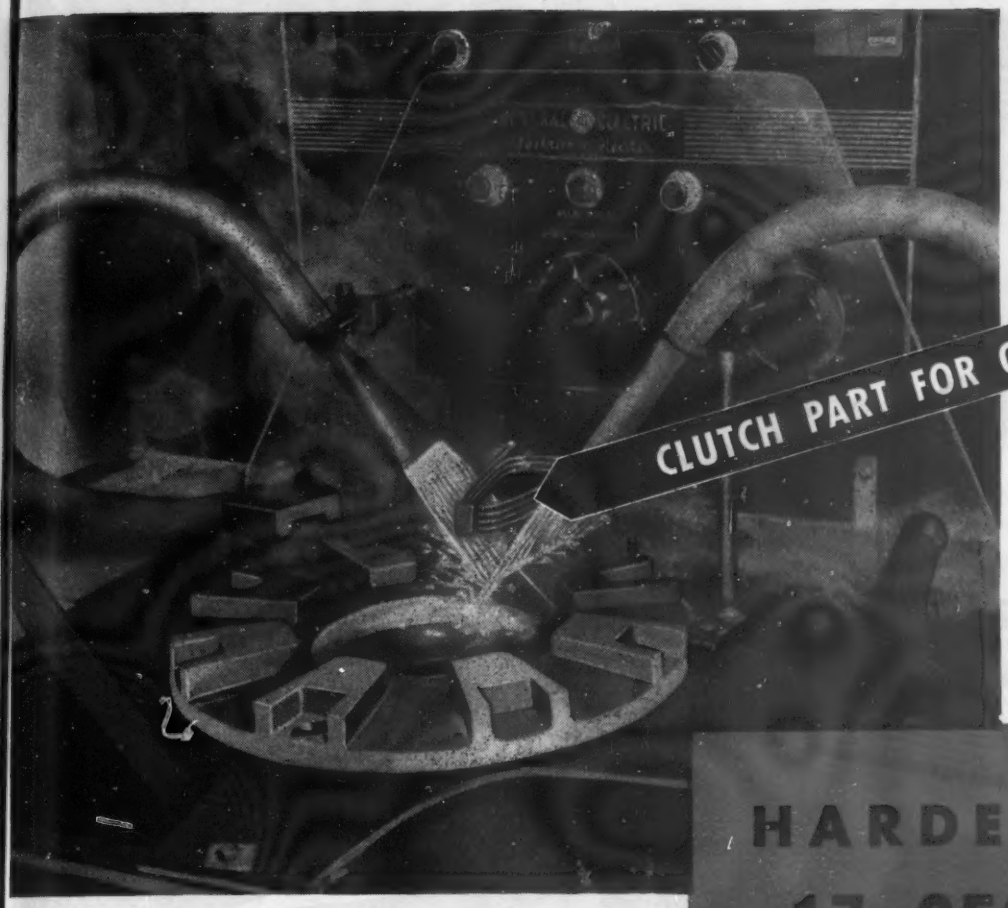
A copy of "Mass Precision," a booklet showing products we have made for other concerns, waits for your request.

W. H. NICHOLS & SONS, 48 WOERD AVENUE, WALTHAM, MASSACHUSETTS

"Accurate" *Nichols*

Ni

PRECISION ENGINEERING AND MANUFACTURING FACILITIES FOR MASS PRODUCTION



CLUTCH PART FOR OIL-WELL HOIST

This 15-kw electronic heater, similar to the one used by Cardwell Mfg. Co., Inc., Wichita, Kansas, is one of a number of sizes produced by G-E for industrial uses.

HARDENED IN 17 SECONDS with Electronic Heating

WHEN a big production hoist yanks thousands of feet of oil well rods and tubing to the surface, much of the strain must be borne by the clutch plate jaws.

To harden those jaws, for longer life, without hardening the entire clutch plate, was a problem of the Cardwell Manufacturing Company, oil rig manufacturer.

We recommended electronic heating. Now, by placing the clutch jaw in an inductor coil connected to a 15-kw G-E electronic heater, the part is raised to the desired temperature *in only 17 seconds*. A water quench completes the hardening process.

Since no scale or distortion results from the electronic heat treatment, the precision machining of the parts can be completed before hardening.

Whether *your* production problems involve the application of heat to a closely limited zone or the brazing or soldering of some complicated assembly—find out, now, how a G-E electronic heater can improve your product quality and increase your output. For details, get in touch with the G-E heating specialist in your nearest principal city, or write General Electric Company, Schenectady 5, N. Y.

BUY WAR BONDS

No. 11 in a series of case studies on the accomplishments of G-E electronic heaters

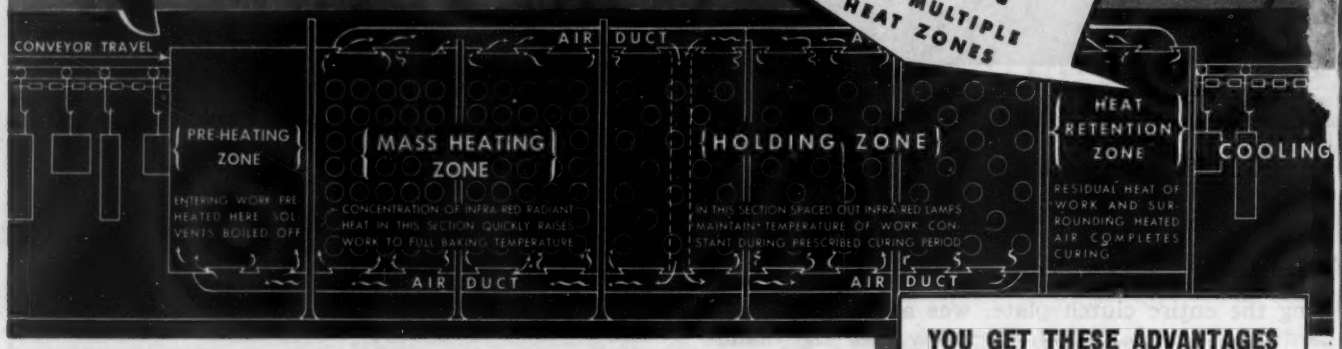
GENERAL ELECTRIC

ELECTRONIC HEATERS

LOW TEMPERATURE HEATING ...is Faster, Better with Infra-Red

ECONOMY-ENGINEERED BY HALL

C. M. HALL Radiair OVEN WITH MULTIPLE HEAT ZONES


CONVEYOR TRAVEL
AIR DUCT
PRE-HEATING ZONE
ENTERING WORK PRE-HEATED HERE. SOLVENTS BOILED OFF
MASS HEATING ZONE
CONCENTRATION OF INFRA-RED RADIANT HEAT IN THIS SECTION QUICKLY RAISES WORK TO FULL BAKING TEMPERATURE
HOLDING ZONE
IN THIS SECTION SPACED OUT INFRA-RED LAMPS MAINTAIN TEMPERATURE OF WORK CONSTANT DURING PRESCRIBED CURING PERIOD
HEAT RETENTION ZONE
RESIDUAL HEAT OF WORK AND SURROUNDING HEATED AIR COMPLETES CURING
COOLING
AIR DUCT
AIR DUCT

With the rush to get new products on the market, production speed with lower, over-all operating economies is a most vital factor. If your work involves low temperature heating (baking, drying, preheating, dehydrating), you can't afford to overlook the advantages that infra-red, as *Economy-Engineered* by Hall, offers you.

The C. M. Hall multiple-zone type oven above shows you how proper design cuts operating costs—how proper consideration and balancing of important factors (such as oven enclosure, recirculation, ventilation, zoning, proper heat cycle, etc.) can make possible some remarkable operating economies.

It is essential that the influence of *every* factor entering into the efficiency of an installation be understood if the energy consumed is to be utilized to greatest advantage. It is this basic, job-tested approach that makes C. M. Hall *Economy-Engineering* of extreme value to you. Get the facts first-hand. Call for a Hall representative.

YOU GET THESE ADVANTAGES

More BTU Value. Hall *Radiair* ovens always have incorporated time-saving benefits of instant infra-red heat plus the extra-use value of recirculated, derived, heated air.

Low Cost. You get a custom-designed oven—built at lower cost with pre-fabricated, standardized assemblies.

Positive Ventilation Control. Removes objectionable fumes and moisture from oven—speeds drying, equalizes over-all oven temperature.

Maximum Over-All Economies. Hall Economy-Engineering fits infra-red heating equipment right into your production line, brings you the fullest advantages: increased production, fewer rejects, reduced space, added safety and cleanliness.

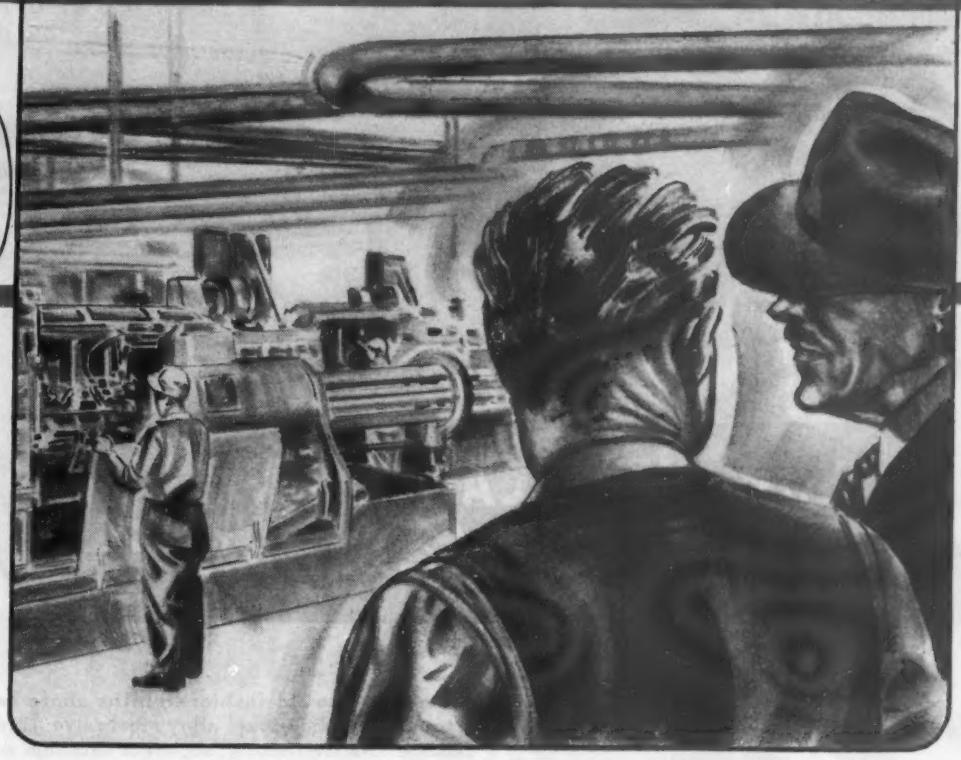
C. M. HALL LAMP CO.

C·M·HALL Lamp Company

PIONEER DESIGNERS AND BUILDERS OF INFRA-RED RADIANT HEATING EQUIPMENT

1005 EAST HANCOCK ST. *Representatives in Principal Cities* DETROIT 7, MICHIGAN

EN-AR-CO PROMAX *Dual Purpose* CUTTING OIL H-75



● Here is a new and important example of National leadership . . . En-Ar-Co PROMAX Cutting Oil H-75 . . . the fulfillment of a wide need. By an exclusive process of inhibiting the corrosive action of sulfur at the temperatures at which machine bearings are operated it is now possible to use an effective cutting oil as a lubricating oil as well.

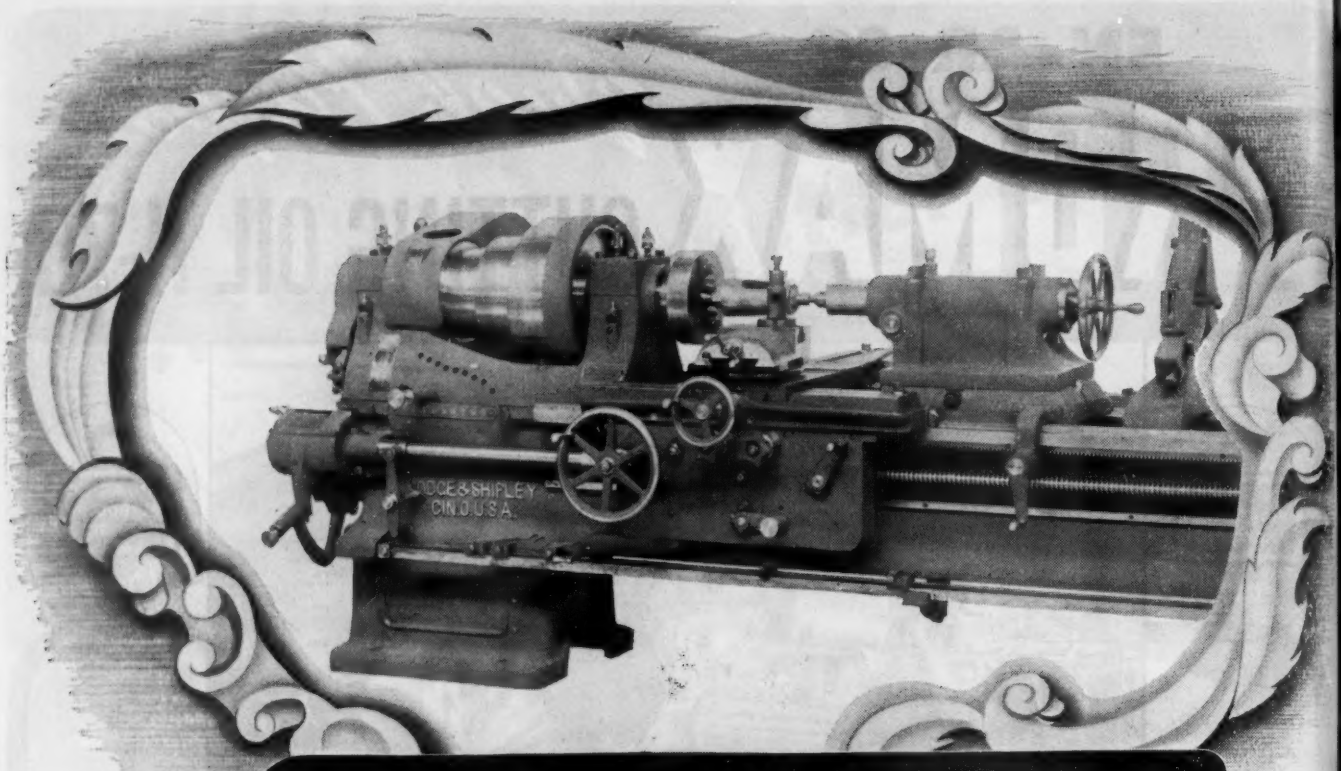
By using En-Ar-Co Promax Cutting Oil H-75 as a cutting oil as well as a lubricating oil in automatic machines the critical problem of leakage from one system to the other is entirely eliminated.

Moreover, when using En-Ar-Co Promax Cutting Oil H-75 there is no necessity for changing cutting oils when changing stock, since it does not stain or corrode non-ferrous materials.

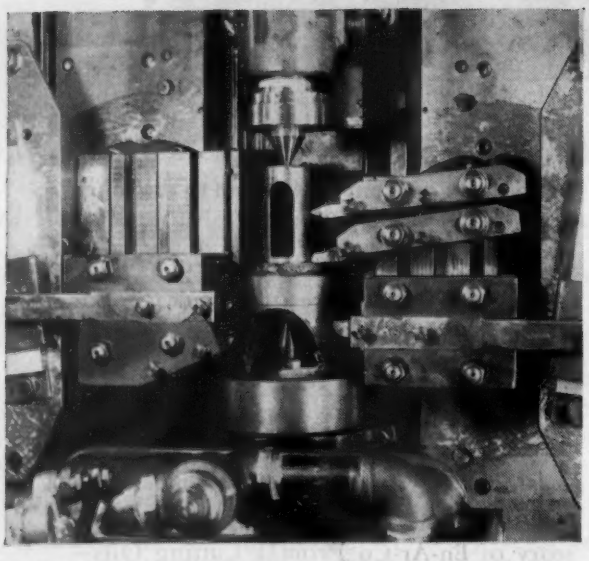
We shall welcome the opportunity of discussing your specific needs to meet your requirements. Write today for complete story of En-Ar-Co Promax Cutting Oils—no obligation.

EN-AR-CO INDUSTRIAL LUBRICANTS

THE NATIONAL REFINING COMPANY
HANNA BLDG. · CLEVELAND 15, OHIO
East of Ohio . . . The Globe Refining Company, Cleveland 15, Ohio



HOW WELL CAN A 1917 LATHE *Do Today's Valve Jobs?*



L & S Engineers will gladly give you a practical demonstration of Duomatic superiority on your own work. There is no obligation. Write for detailed literature No. 601 and No. 620 on 2A and 3A Duomatics.

●Imagine the old-fashioned lathe above being used on a tough chrome nickel alloy steel valve. Limited to a few feeds and a single tool, separate settings were required for straight and taper turning. In those days it took a skilled operator considerable time to turn a valve job.

Obviously, this lathe would be completely inadequate for a shop requiring high output, precision work, and low costs. Yet lathes even a few years old may be almost as obsolete—when placed alongside the new 2A or 3A Duomatic, Lodge and Shipley *full automatic* lathes.

Consider the valve plug at the left done on a 3A Duomatic. Multiple tools perform all straight turning operations at one time, front and rear, and taper turning front and rear—simultaneously. The set-up for two tapers is easily converted to set-ups for tapers of different sizes. An unskilled operator can turn out precision valve parts quickly and economically.

Dual tool slides—front and rear—operate singly or together . . . can be used for a wide range of cycles in turning and in straight and angular facing operations. A Duomatic is like two lathes in one. It may actually equal *several* of your old or pre-war models in total output, plus quality and accuracy never before obtainable.

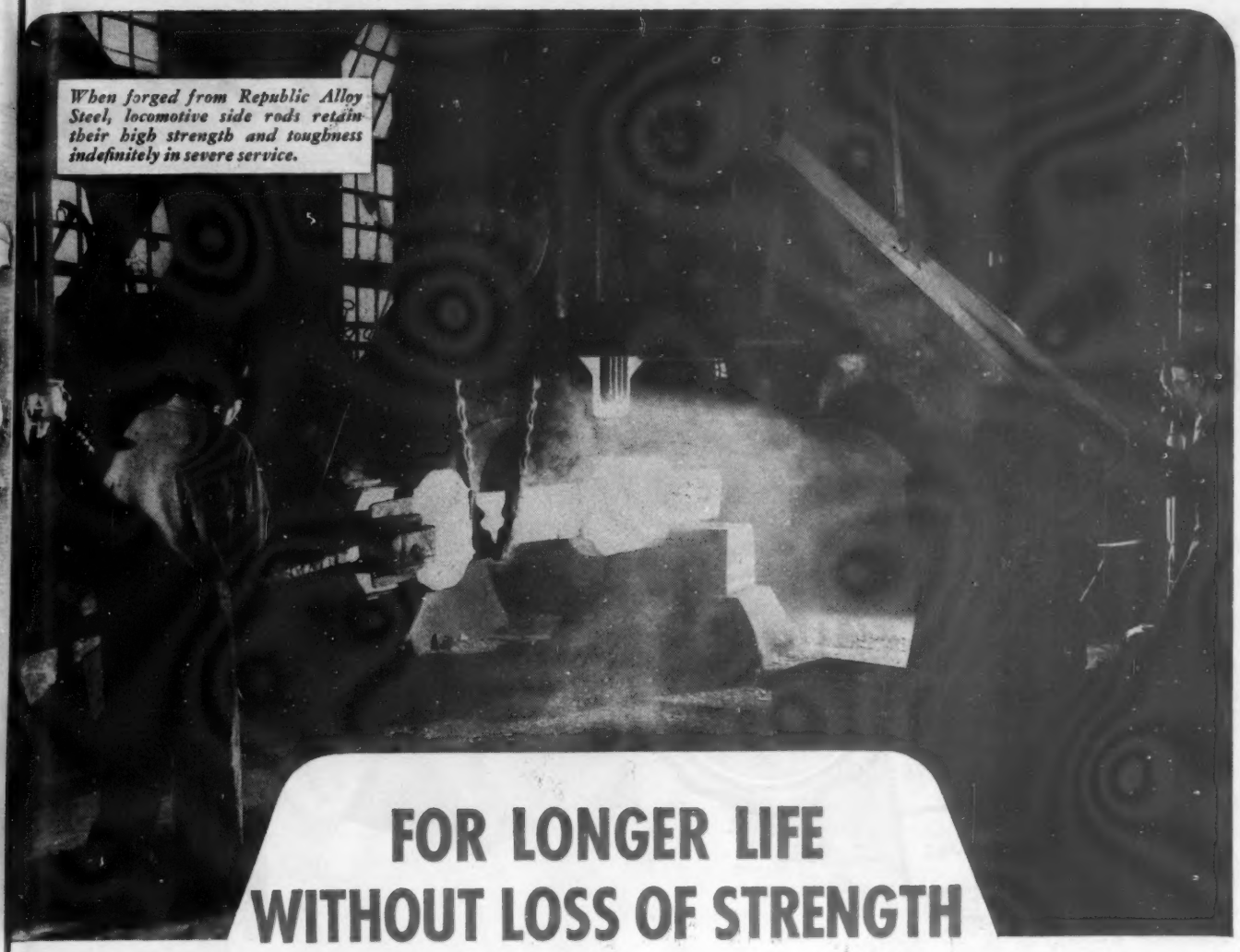
LODGE & SHIPLEY

MACHINE TOOL CO.

L & S LATHES

CINCINNATI 25, OHIO, U. S. A.

MACHINE TOOL DIVISION 3055 COLERAIN AVE. • SPECIAL PRODUCTS DIVISION 800 EVANS ST.



When forged from Republic Alloy Steel, locomotive side rods retain their high strength and toughness indefinitely in severe service.

FOR LONGER LIFE WITHOUT LOSS OF STRENGTH

—no other material can equal ALLOY STEELS

One of the most important reasons why you should use alloy steels for vital operating parts of all types of machinery is the inherent ability of these steels to retain their original strength under the most severe conditions.

As examples, consider locomotive side rods, in which sudden reversal of stresses continually attempts to cause failure through fatigue . . . or engine bolts which must absorb varying concentrations of stress . . . or engine pins which must resist severe shocks and strains even when operating in sub-zero cold.

Alloy steels provide *LASTING* strength to assure year-after-year safety in operating parts—to assure longer life and lower maintenance costs. And, in addition, they afford highest strength-to-weight ratios, uniform hardness, extreme toughness, and resistance to corrosion and high temperatures.

Republic—world's leader in the production of alloy steels—is ready NOW to help you select the most effective and economical analysis for each application. Write us.

REPUBLIC STEEL CORPORATION
Alloy Steel Division • Massillon, Ohio
GENERAL OFFICES • • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N. Y.

Republic ALLOY STEELS

Other Republic Products include Carbon, Alloy and Stainless Steels—Pipe, Sheets, Plates, Strip, Bars, Wire, Rails and Rods, Tubing

This Grinder Went to College

DoALL SURFACE FINISH ANALYSIS
FOR MODEL G-1 GRINDER
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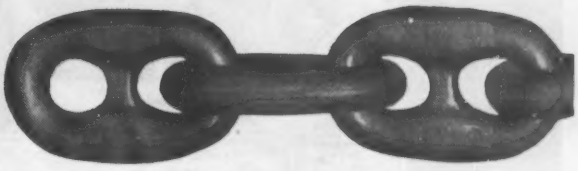

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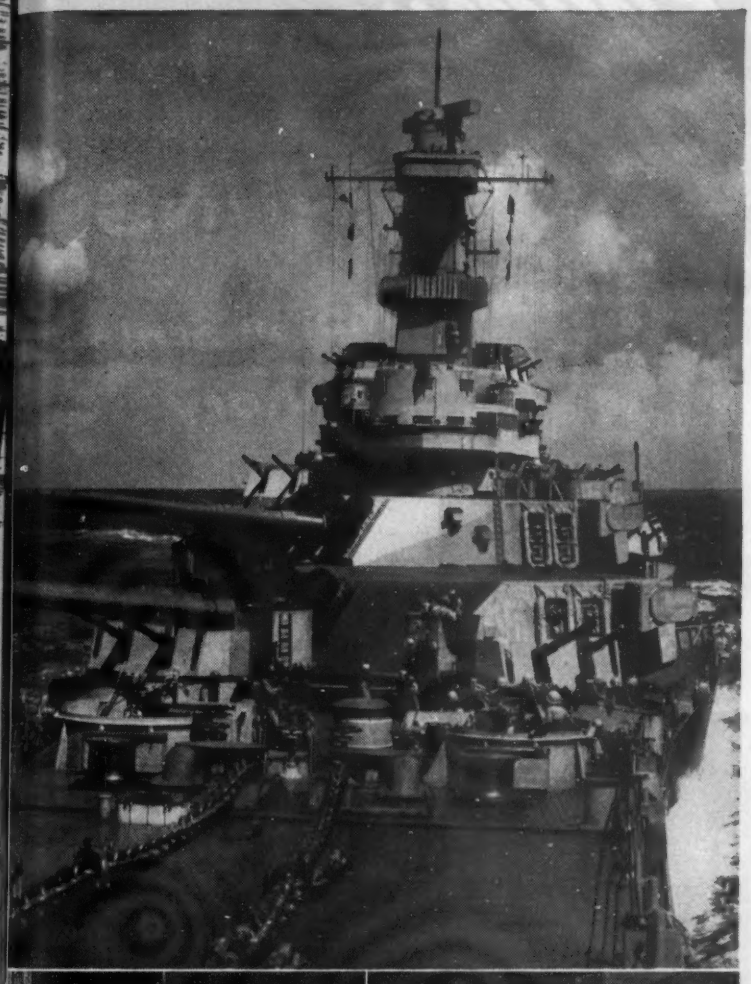

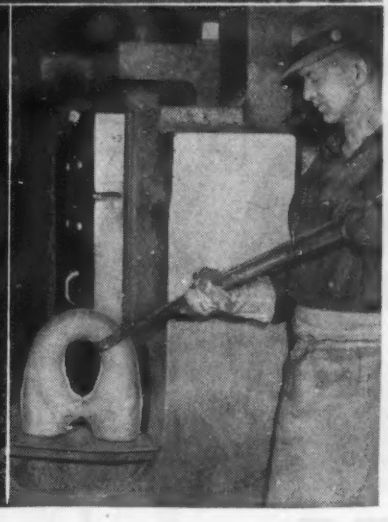

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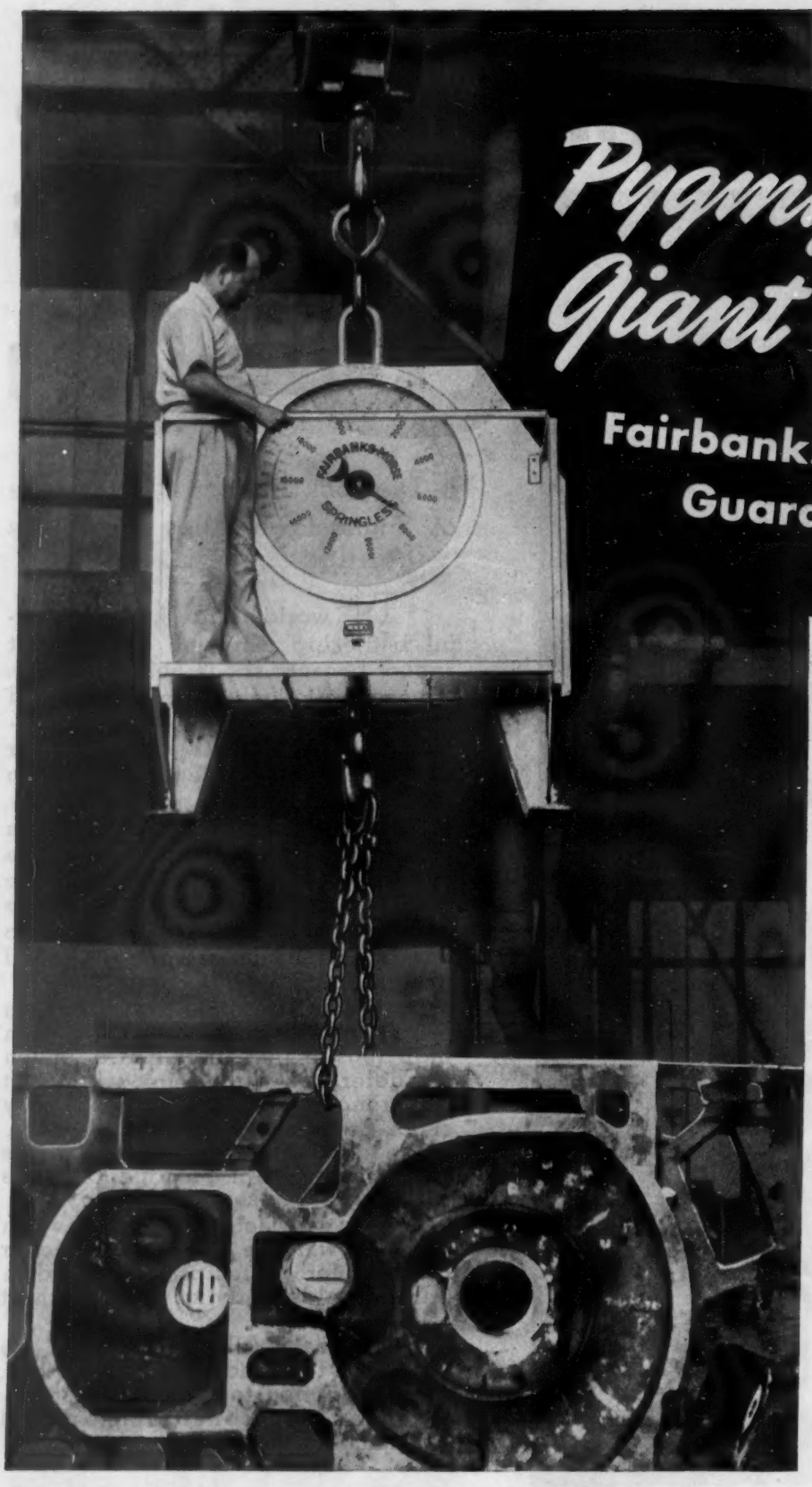

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STEEL

The Magazine of Metalworking and Metalproducing

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ARMY ★ E ★ NAVY

UNION CHAINS

STEEL
October 29, 1945

Overdue Justice

Under the National Labor Relations Act, the National Labor Relations Board is empowered (1) to prevent interference by employers with employees' rights of self-organization and (2) to determine the "appropriate" unit to represent employees in collective bargaining.

Fair-minded persons would say that under this authority, NLRB would be doing its duty satisfactorily if it prevented employers from employing intimidation or coercion to interfere with proper unionization and if it certified as collective bargaining agency any union which had as bona-fide members a clear-cut majority of the employees in a plant.

Unfortunately, NLRB has not pursued this policy. Instead it has set up arbitrary interpretations of the law and has committed flagrant acts of discrimination. As a result, there are hundreds of instances where employees are represented, not by bargaining agencies of their own free choice, but by "pet" unions thrust down their throats by NLRB chicanery.

NLRB has used two tricks with phenomenal success. First, it has distorted the meaning of "interference" on the part of employers with employees' self-organization so effectively that many employers are convinced that if they talk with employees about unionization they commit an "unfair labor practice." Secondly, by throwing out one election after another on flimsy pretexts, NLRB has permitted insignificant minorities to gain collective bargaining privileges they do not deserve.

But NLRB has stubbed its toe. In May, 1942, and in October, 1944, it conducted elections at plants of the Thompson Products, Inc. to determine whether or not a UAW-CIO union was the "appropriate" bargaining agent. In both elections the employees voted against the union decisively. Despite this overwhelming vote, NLRB refused to drop the case. It ordered another election Oct. 23, 1945, and in addition it applied to the United States Sixth Circuit Court of Appeals in Cincinnati to restrain Thompson Products from "interfering" with this election. Circuit Judges Xenophon Hicks, Charles C. Simons and John D. Martin denied the application. While they made no comment on their decision, it is clear that they feel the National Labor Relations Act was not intended to infringe the constitutional right of free speech. At the Thompson election last Tuesday, employees for the third time voted down the union decisively.

American industry owes Frederick C. Crawford, Thompson Products president, a debt of gratitude for his success in calling NLRB's bluff on free speech by employers. The public will commend the circuit judges for their courage in upholding constitutional rights against powerful opposition.

OUR "SECRET WEAPON": At the 44th annual meeting of the National Machine Tool Builders' Association in Chicago, three machine tool builders who recently returned from official missions abroad presented a symposium on conditions in Europe in which this arresting statement was made: "When the war ended, Germany—in spite of all the bombing of its industrial plants—still had left in reparable condition probably more machine tools than we at this moment have in the entire United States."

This statement speaks volumes for the manner, system or technique under which machine tools are employed for effective production. Germany concentrated largely on tooling for her own war machine. She gave only meager assistance to her axis partners. The United States not only tooled industry for its tremendous two major wars, but also

(OVER)

shipped great quantities of munitions to England, Russia and other allies. How does one account for the fact that the United States, with fewer tools, made a much more impressive record of production than did the Germans?

There are several explanations. One is that our free labor was more effective than her forced and slave labor. More important, however, is the fact that our organization—our adaption of human skills to machine operation—is superior to that of any other industrial nation. —p. 74

• • •

LONG RANGE FOLLY: In seeking a 30 per cent increase in basic wages for automobile workers, a union leader argues that General Motors could grant this increase, pay 15 per cent more for materials and still make a 50 per cent greater profit than in 1941, even if the 1946 cars were to be sold at prewar prices.

This is a reckless attempt not only to confuse the issue but also to establish a direct relation between wages and profits. It overlooks a number of factors which might boomerang to the consternation of automotive employees if the union leader's proposition were to be considered seriously.

How many employees would be willing to work without pay, as stockholders' money often does, when the employer is operating in red ink? One fear: union leaders are so eager to exploit momentary opportunities that they ignore the long-range consequences of their present attitude. —pp. 69, 70, 71

• • •

"KNOW HOW" ON TAP: In an article reviewing wartime developments in cutting steel under water, the author comments that "had the crew of the Scharnhorst possessed a means of quickly cutting off under water the damaged hull plates that caused her to travel in a big circle, she might have escaped the final blows that sunk her and so might have lived to cause the Allies much more trouble."

This hypothetical statement emphasizes the importance of co-ordination between the fighting forces and the industrial resources of a nation. American industry had perfected means of cutting steel plate under water and, equally important, the Navy made good use of this facility. Perhaps somewhere in Nazi Germany were experts who knew how to cut steel under water, but if so, the knowledge was not available to the German navy.

This experience points to the desirability in the years ahead of maintaining such close liaison between Army-Navy and industry technicians that every detail of pertinent "know-how" will be on tap promptly and continuously. —p. 102

POSTWAR POSTSCRIPTS: United States Army Engineers are ready to start work on river, harbor and flood control projects involving expenditures of $900 million (p. 80) and additional projects of similar nature, to cost $594 million and already authorized by Congress, will be ready by late spring . . . . Ira Mosher, president of NAM, says pointedly that the nearest approach to "full employment" since 1900 has been without benefit of government spending. From 1900 to 1930 "we dropped below full employment by more than 4 per cent in only one year—1921" (p. 81), whereas from 1930 to 1941, when government was making strenuous efforts to create employment "we got within 10 per cent of full employment in only one year—1937" . . . . Merger of Wickwire Spencer Steel Co. and Colorado Fuel & Iron Corp., recently approved by stockholders of both companies (p. 77), was effected last week at a meeting of the board of directors at which E. Perry Holder was elected president of the Colorado company, of which Wickwire Spencer will be a division . . . . OPA has authorized an increase of 75 cents per ton in the price of pig iron (p. 72) to offset higher costs. This follows a $1 per ton increase authorized last February . . . . Ford last week was assembling 400 cars and 500 trucks daily (pp. 85, 86), Buick 100, Oldsmobile 100 and Pontiac 150. Plymouth will be the first division of Chrysler to begin assemblies, with an initial schedule of 180 per hour . . . . Bethlehem Steel will build a new open-hearth and additional finishing facilities costing $8 million (p. 82) at its Los Angeles plant . . . . A quick scanning of discussions at conventions held last week—National Machine Tool Builders' Association (p. 74), Foundry Equipment Manufacturers' Association (p. 75) and Gray Iron Founders' Society, Inc. (p. 76)—indicates labor supply, labor relations and material and equipment procurement rank with prices as the major problems in reconversion . . . . Morris B. Pendleton, president Plomb Tool Co., Los Angeles and regional vice chairman of CED, says that the biggest job in reconversion (p. 83) "may prove to be that of reconverting the attitudes of workers, making them realize that industry is no longer on a cost-plus basis" . . . . The Victory Loan drive starts today and will continue into December. Give it your best effort so that industry can maintain to the end the fine record it has achieved in previous campaigns.

E. L. Shaner

EDITOR-IN-CHIEF

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STEEL
October 29, 1945

Labor Disputes Reach Impasse In Absence of National Policy

United States Steel and Youngstown Sheet & Tube tell union they cannot grant wage increase unless prices are advanced. Automobile workers vote to authorize strikes. Potential industrial strife building up on eve of labor-management conference

LACK of any clearly defined national policy on postwar wages and prices is preventing the settlement of labor disputes now confronting many basic industries and which are shaping up into potential widespread industrial strife.

While Washington dawdled over the formulation of a wage-price policy last week, the United Automobile Workers-CIO voted to authorize strikes in the plants of two leading automobile producers and negotiations between the United Steelworkers of America and leading steel producers reached an impasse.

The issues in these disputes, and in virtually all others pending, are the same; the unions are asking heavy hourly rate increases which will maintain weekly wages at the wartime rate; management holds such increases are impossible unless prices are substantially raised.

In the absence of any outright declaration by the national administration, unconfirmed stories from the capital indicate the President's advisers are urging a policy whereby labor would be granted substantial increase—15 or 20 per cent—while prices are held at present levels, a squeeze being put on profits. These advisers argue that the reduction in wartime premium payments for overtime, plus anticipated tax relief, plus a cut in profits would enable employers to pay the higher wages.

Industrialists note obvious fallacies in this line of reasoning. In the first place the high wartime wage rates, including overtime premiums, were established for work that was paid for by the government and bears no relationship to costs for prewar peacetime products. In the second place, wartime excess profits taxes applied to profits made in pro-

Employer's Right to Free Speech Upheld; Workers Reject Union

EMPLOYEES of Thompson Products Co., Cleveland, last week rejected overwhelmingly, for the third time in three years, attempts of the United Automobile Workers to gain collective bargaining rights in the company's plants. The first two elections were voided at the insistence of the National Labor Relations Board on the ground that company officials through addresses and distribution of literature had interfered with the election. Just before this year's balloting, the NLRB sought an injunction to prevent Frederick C. Crawford, president of the company, from addressing employees on the issues to be voted on. The injunction was refused by the Sixth Circuit Court of Appeals at Cincinnati. Mr. Crawford addressed the workers (see photo), and the employees rejected the outside unions.

ducing tremendous quantities of war goods. Profits on the manufacture of peacetime goods are not expected to be comparable to war profits.

In some quarters it is believed the administration will enunciate no wage-price policy until after the labor-management conference which is scheduled to start Nov. 5. To proclaim any policy now, it is contended, would hamper delegates to the conference in formulating a program for industrial peace.

President Truman last week announced the appointment of Walter P. Stacy, chief justice of the North Carolina Supreme Court, as chairman of the labor-management conference. Justice Stacy has served as a labor mediator under three former Presidents, was a former member of the National Defense Mediation Board, and served as associate member of the War Labor Board and the National Railway Labor Panel.

Many observers believe the cause of industrial peace would have been well served if the union wage demands had not been pressed until after the labor-management talks in November. The United States Steel Corp., in fact, asked Philip Murray, president of the CIO and the steelworkers union, to postpone negotiations on the union's demand for a $2-a-day increase until a national wage-price policy had been established. Mr. Murray refused and then was informed by U. S. Steel that existing ceiling prices for steel products together with the government's wage stabilization policy do not enable the corporation to grant a wage increase at this time.

Youngstown Sheet & Tube Co., in a letter from J. C. Argetsinger, vice president and general counsel, also has informed the union the company cannot grant the wage increase unless steel prices are increased by the OPA.

"Under present OPA ceiling prices," Mr. Murray was informed in a letter stating the position of U. S. Steel, "which are little above the quoted prices for steel before the war, the huge increases in labor and costs since 1940 have brought us to the point where we are today selling a great majority of our steel products at less than cost." The letter continued that if U. S. Steel is to continue in business, and do its share in providing steel and jobs, there must soon be substantial price increases to compensate for past cost increases.

Under the President's stabilization program, U. S. Steel said, the company is "not free to raise wages because its prices for steel products must even now be increased to compensate for its present high costs."

Terming the union's wage demand "staggering," U. S. Steel said it would amount to an increase of 22.1 per cent in weekly straight-time wages, with a 16.7 per cent reduction in productive hours per week and a consequent reduction in the weekly steel output per worker. Direct labor costs to U. S. Steel subsidiaries would be increased by $128 million a year, equivalent to $6 a ton of finished steel at capacity operations.

The letter to Mr. Murray further asserted that at present wage rates, the average straight-time pay for a steelworker in the five steel-producing subsidiaries is $1.131 per hour, excluding any overtime premium. "This amounts to approximately $45.25 for a 40-hour work-week, without overtime, as compared with an average of around $34 for 40 hours work per week before the war. Today steelworkers rank among the highest paid wage earners in American industry."

The union policy committee met in Pittsburgh Friday to consider the union's next move.

The Canton, O., works of Timken Roller Bearing Co. and the company's Columbus, O., bearing plant already have been struck in a dispute over wages. United Steelworkers representatives started picketing the plants Sept. 22 to prevent employees from working more than 40 hours a week, despite the fact time and a half was paid for the overtime work. Subsequently, the company offered a 10 per cent wage increase. This was refused by the union which insisted on a $2-a-day raise. After six weeks of agitation the union succeeded in closing the plants.

General Motors Chief Advances Wage Plan

Suggests maintenance of take-home pay by increasing working time to 45 or 46 hours weekly with accompanying boost in basic wage rate of 5 to 8 per cent

STALKING the industrial front throughout the United States are the four horsemen of Confusion, Dissension, Ignorance and Despair. Post-reconversion production is being delayed and, where started, progresses in fits and starts. The entire price picture is a mess. End product prices cannot be determined because no prices can be obtained on materials and components. The latter are in a state of animated suspension because of the unsolved wage question.

All eyes were turned last week toward the automotive industry where strike votes were in process at General Motors, Nash and Chrysler plants to reinforce the arguments of union negotiators asking for a 30 per cent boost in basic wage rates. It becomes increasingly clear the answer to these demands is the key to the entire industrial wage-price dilemma.

The "30 per cent or else" demand of unions is based on the maintenance of wartime takehome pay which generally was the equivalent of 52 hours per week base rate pay for 40 hours of work. With termination of war contracts, many plants have returned production employees to a 40-hour week, with resultant loss of 12 hours' pay. It is held to be economically impossible to maintain the 48-hour week, with premium pay for 8 hours.

Union leaders are insisting on 52 hours' pay for 40 hours' work, or in other words continuation of wartime premium wages for 16.7 per cent less production.

Managements in the automotive industry, in refusing the 30 per cent demand, have pointed to its inflationary aspect, and have called attention to the fact they are restricted from making any price increases to absorb a wage increase of this order.

The automotive industry is already the highest paying industry in the country and plans to continue that position. However, its leaders realize once any substantial wage increase of the size demanded by the UAW-CIO is granted, all industry, from iron ore mining to the manufacture of radiator ornaments, would have to make comparable adjustments, and the automotive cost picture would become chaotic. Automobile companies make no bones about the matter. They say a 30 per cent wage increase would simply force them to close their plants.

What, then, is the pattern for industrial peace, for economic solvency?

On the government's side, no concrete suggestions for a policy have been offered. Rather, it appears government's policy is to have no policy. Secretary of Labor Schwellenbach's recent ill-advised suggestion in the oil industry tieup of 15 per cent increase followed by arbitration of the difference between 15 and 30 per cent is viewed in some quarters as probably about as unfair as could be imagined. President Truman to date has continuously side-stepped the issue. Congress rumbles but has done nothing.

Recently C. E. Wilson, president of General Motors, presented a plan at a Detroit press conference including, among others, 15 reporters from a number of metropolitan papers making an air tour of the nation's industry at their own expense but at the invitation of the National Association of Manufacturers,

which has been quoted widely in the press, but which bears detailed examination. Briefly, it is this:

The only way to justify increased wages is for them to be accompanied by increased production. Particularly in the next three to five years, this country is faced with the enormous burden of high public debt plus the need to assist in restoration of a near-destitute and destroyed Europe and Far East. Adding to this the extra effort which will be involved in restoring production lost in this country during the war years, it seems evident some extra effort on the production front is called for.

Maintenance of wartime takehome pay for working people is desirable if it can be accomplished without simply dishing out more money for work not performed. It might be realized by increasing the work week from the present 40 hours to 45 or 46 hours (without premium pay), accompanied by a 5-8 per cent increase in base wage rates.

How would this work. Take the case of a worker whose base rate is $1.50 per hour. During wartime, this is the story:

(A) Base rate ..... $1.50 per hr
48 hours of work (production)
8 hours at time and a half
$78.00 weekly takehome pay

When the work week was cut back to 40 hours after war contract terminations, the change was as follows:

(B) Base rate ..... $1.50 per hr
40 hours of work (production)
16.7% decline in production
$60.00 weekly takehome pay
23% decline in wages

Here is what the UAW-CIO proposes:

(C) Base rate ..... $1.95 per hr
40 hours of work (production)
16.7% decline in production from wartime level
$78.00 weekly takehome pay
0% decline from wartime

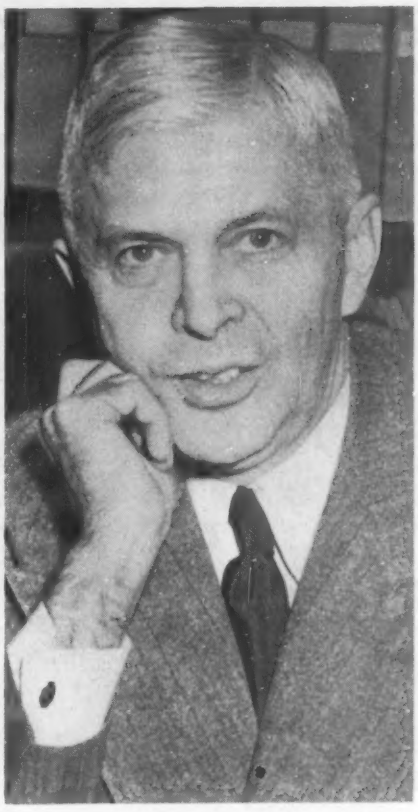
and where plants, with heavy reconversion schedules, are still working 48 hours it would mean:

(D) Base rate ..... $1.95 per hr
48 hours of work (production)
same level as during war
$101.40 weekly takehome pay
30% increase from wartime, or the equivalent of 67.6 hours at present rates

Here, briefly, is what Mr. Wilson proposes:

(E) Base rate ..... $1.62 per hr (up 8%)
45 hours of work (production)
down 6.25% from wartime
$72.90 weekly takehome pay
down 6.5% from wartime

This last suggestion is based on more pay for more production, and eliminates the arbitrary 50 per cent premium for work over 40 hours per week, although the latter would still apply to work in excess of 45 or 46 hours. At the same time, workers' takehome pay is virtually maintained (it would be the equivalent on a 48-hr straight-time week), which is the principal bone of contention on the part of unions. As far as costs are concerned it would appear to be acceptable, since it represents an 8 per cent increase in base rate, accompanied by a 12 to 15 per cent increase in production over the 40-hr week. This of course is assuming a return to 1941 levels of productivity and individual effort, a trimming of overhead burdens to the point where they were in 1941 and a comparable tax structure. All of these are major "ifs" and could require a lot of concentrated and intelligent analysis by management and supervisory forces, along with cooperation from labor, to achieve.



C. E. WILSON

Principal barrier to Mr. Wilson's plan, as he sees it, is that it would require legislation to suspend, temporarily at least, the 40-hr week, something to which labor unions probably never would accede, fearful lest they lose some of the gains won over the past ten years. For this important reason, the GM president is not in the least optimistic his suggestion stands much chance of success. Its adoption rests at the congressional level, since Congress represents the bulk of public opinion and is the law-making body of the country. Neither the President nor the Secretary of Labor have the power or willingness to place such plan in effect; it is not politically expedient.

Meanwhile, management is powerless to act. It is hemmed in by minimum wage and hour laws, by OPA price ceilings, by stabilization directives, by union contracts. Many of the latter are not worth the paper they are printed on as far as union observance of them is concerned, yet they are still contracts in the eyes of managements.

Union leaders have carefully avoided even talking about the desirability of working a little harder or little longer to justify wage increases. They harp on the theme that increases can be paid out of wartime profits, out of assumed future profits, out of excess profits tax refunds, out of an increased rate of production, etc.

With the exception of possibly a few

(*Please turn to Page* 172)

Steel Distribution Starting To Assume New Peacetime Pattern

STEEL distribution figures for the first six months of 1945 indicate that slightly greater percentages of total shipments went to the container industry, to jobbers, dealers and distributors, and to pressing, forming and stamping firms, compared with their relative positions in 1944, the American Iron & Steel Institute reported last week.

The dominant position of shipbuilding as a steel consumer has disappeared.

Meanwhile, statistics have been compiled showing where all the finished steel went from January, 1942, to July, 1945. In that three and one-half year period, more than 28 per cent of the nation's finished steel went to makers of ships, airplanes, combat tanks, ordnance and projectiles. Those classifications received 60,335,000 tons out of total shipments of 210,058,000 tons from the start of 1942 to the middle of the current year. At the same time, millions of additional tons went into war efforts through other manufacturing channels.

Jobbers, dealers and distributors ranked second during the three and one-half year period, receiving 25,365,000 tons; exports came next with 20,150,000 tons, followed by construction which consumed 19,917,000 tons. The steel converting and processing industries such as wire drawing shops, forging shops and so on, took 18,203,000 tons. Railroads received 16,750,000 tons; containers got 13,184,000 tons; pressing, forming and stamping received 9,767,000 tons; machinery and tools received 8,802,000 tons; the automobile industry received 5,539,000 tons; oil, gas, water and mining received 4,913,000 tons; agricultural implements received 2,847,000 tons.

The statistics indicate the sharp percentage declines suffered by such steel-consuming industries as the automotive, construction, railroad, steel container, and the oil, gas, water and mining fields, in comparison with their prewar rank. From now on, with the nation returning to peacetime operations, these industries will get larger shares of the total steel distributed.

Pig Iron Price Increase Effected

Advance of 75 cents permitted by OPA to offset higher costs. Action on steel prices still delayed. Producer sets up new basing point on tool steel

CHESTER BOWLES' Office of Price Administration last week moved to ease the price-cost squeeze in which pig iron producers have been squirming for months past. It announced an immediate increase of 75 cents per ton in prices "to enable the industry to obtain the rate of return required by OPA's overall earnings standard." (New base prices are quoted on page 159). The price increase applies on all grades except charcoal iron.

This was the outstanding development of the week pricewise in the iron and steel trade. However, application of warehouse operators to the OPA for relief from the principle of absorbing mill price increases commanded attention in steel circles, as did the action of a leading producing interest in extending the number of basing points at which it quotes tool steel.

In the case of pig iron, last week's increase is the second granted in pig iron ceilings since price control was effected June 24, 1941. The first increase, Feb. 14, 1945, was for $1 per ton and at that time OPA stated a re-examination of the operations of the industry would be undertaken to determine the effect of the price adjustment in the light of changes in operational costs.

Last week's increase is the result of that study which showed that costs of producing iron rose sharply during the first half of 1945. Increased prices on coal have been effected and unavoidable deterioration in coal quality has increased the quantity of coke needed in production. In addition there have been increases in labor costs in both pig iron and integrated operations.

Calculations of OPA based on data developed after completion of its earlier survey indicate the industry's return on net worth was slightly below 3.7 per cent.

OPA stated, in announcing the price increase, consideration is being given to recommendations by the Industry Advisory Committee that the years 1936-1939 do not constitute a representative peacetime period for the industry and that a different base period be used in applying the overall earnings standard. Pending completion of its study, however, OPA says it does not consider it proper to withhold price action until a final answer can be given, pointing out that cost increases have reduced earnings below even the 1936-1939 level and an adjustment in maximum prices is required under the law. OPA's decision with respect to the base period will be made known soon, it is understood.

Thousands of B-29 parts stacked on the floor of the Bell Aircraft bomber plant in Marietta, Ga., are awaiting sale as surplus property. In the background may be seen unfinished planes on which production was halted on V-J Day. All material, machinery and parts in the plants are now being offered for sale by the RFC. NEA photo

In pig iron trade circles the permitted increase, while welcome, is not considered adequate. It is pointed out that the advance is based on a 40-cent per ton increase in by-product coke prices last June and increases of 25 cents per ton on hand-drawn beehive coke and 50 cents per ton on machined beehive coke the latter part of May. At the same time it is emphasized that the $1 per ton increase in pig iron last February did not cover accumulated increased costs.

In view of the action on pig iron some speculation has arisen with regard to the possibility that OPA may shortly act on the steelmakers' recent request for a general steel price advance of up to $7 per ton. In informed circles, however, it was stated OPA action on the question seemed unlikely until the wage problem now before the industry is out of the way. Also it was said price action may be withheld pending congressional action on taxes. While it is known OPA officials favor some price relief on steel products, and that such relief will be granted in the not too distant future, it is said, the increase when it comes, will not exceed $2 to $2.25 per ton and will not be an across-the-board advance, some products being upped more than others, with some not being increased at all. Further, adjustments in the extra schedules, under consideration for months past, will have a bearing on OPA's decision.

The basing point situation continues a very hot topic of discussion following recent action in extending the number of basing points at which products are quoted. Up to late last week, however, independent producers had not followed the lead of the Carnegie-Illinois Steel Corp. in establishing Youngstown as a base on carbon bars and small shapes, alloy bars and spring steel flats, alloy bar strip and alloy strip. It is understood producers in the Youngstown district still had the matter under discussion.

Some basing point action was reported on tool steel however. Allegheny-Ludlum Steel Corp., Brackenridge, Pa., was reported to be establishing Dunkirk, N. Y., as a base on all its tool steel products, covering forging billets, bars, drill rods and bits, including high-speed steels. Some time ago the Steel & Tubes Division, Timken Roller Bearing Co. set up Canton, O., as a base on its line of tool steel products which do not include high-speed steels. Basing points on tool steel now are Pittsburgh, Bethlehem, Pa.,

Syracuse, N. Y., Canton, O., and Dunkirk, N. Y. However there are additional production points, including Chicago Heights, Ill., Reading, Pa., Philadelphia, Bridgeville, Pa., Washington, Pa., Braeburn, Pa., Latrobe, Pa., McKeesport, Pa., and Lockport, N. Y.

Anticipating further increases in prices on steel mill products, secondary warehouse operators have filed with the Office of Price Administration a plea for relief from its price absorption policy, which, it is alleged, has in the past exerted unwarranted hardships on resellers of steel and which promise to become even more serious in the future.

The secondary distributors in addition to secondary items handle a large volume of prime material.

Experience of the industry, it is said, has shown that it has suffered unduly by price increases at the mill level which it has been required to absorb, and it will be unable to absorb any further increases in mill prices without securing compensating price increases at the warehouse level. It is maintained that the techniques adopted for individual warehouse price relief are not adequate because the accounting task of collecting and analyzing the required data is so heavy and burdensome that it presents, for all practical purposes, an insurmountable obstacle.

Secondary Warehouses Protest

At a meeting of the Secondary Steel Products Industry Advisory Committee recently the subject was thoroughly discussed and out of this meeting came the decision to appeal to OPA for relief. A resolution adopted at the meeting and forwarded to OPA, declares that since the committee has been officially notified additional increases in the prices of steel products at the mill level are contemplated, and the secondary warehousing industry has been compelled to absorb certain mill price increases in the past as well as increased costs for labor, salaries, trucking, maintenance, etc., and is now facing a period of declining demand for warehouse steel as well as a decrease in size and volume of orders, the industry committee is opposed to the prior absorption of mill increases effected last May, and to any further absorption of increases in mill base or extra prices.

In its application for relief for the secondary warehouse interests the committee filed with OPA various data with respect to costs, selling prices, and profit position, data being projected into 1946 to show anticipated loss on inventory, increase in operating expense, smaller volume and the extent of price increase.

Recently OPA announced that warehouses that are unable to obtain particular products from their usual suppliers may apply for permission to increase their ceilings to cover the actual carload costs incurred in buying from other sources of supply and having it processed for resale at another location. This relief is made possible in amendment 35 to price schedule No. 49. Permission to make the adjustment will be granted only if the applicant is unable to obtain the products from usual sources, if established ceilings are below applicant's actual carload cost, if the products involved are essential to a peacetime economy and were not bought from another warehouse or jobber.

Buff and Polishing Wheel Pricing Provisions Revised

Sellers of buff and polishing wheels made of cotton textiles were authorized last week by the Office of Price Administration to add to their ceiling prices the dollar-and-cent amount of the increase in the cost of textiles resulting from upward adjustment of textile prices as required by the Bankhead amendment.

Price Control Over More Consumer Goods Lifted

Office of Price Administration has exempted from price control a number of consumer goods, including the following: All boats 25 feet or less in length, except toy boats; bowling and billiard equipment and accessories; imitation, synthetic and semiprecious stones for jewelry purposes only, and jewelry findings (working tools), mountings, insignia and emblems; magazine racks and baskets, except tables or combination units; scientific instruments designed specifically for use in repair or assembling of watches or clocks; certain mortuary equipment, including bronze cinerary urns and casket lowering devices; plaques and loving cups awarded as trophies; ice cans sold to industrial users; and porch gates sold to jobbers for $1.40 or less.

New Schedule Covers All Electrical Wire and Cable

Maximum price regulation No. 82, Wire and Cable, superseding all other schedules governing sales of electrical wire and cable, was issued last week by the Office of Price Administration, effective Oct. 29.

The new regulation includes on its pricing lists every type of wire conducting electricity, including aluminum and nickel-alloy. Cable accessories and portable "trouble lamps" have been omitted from the pricing lists of the regulation and have been transferred to price regulation No. 136, Machines, Parts and Industrial Equipment.

Present, Past and Pending

■ WESTERN UNION PLANS NATIONWIDE RADIO RELAY SYSTEM

NEW YORK—Western Union Telegraph Co. plans to establish superhigh frequency radio relay systems with towers 30 miles apart during the next seven years. These ultimately will replace many pole lines and hundreds of thousands of miles of wire.

■ CPA TO RETAIN 176 KEY INDUSTRY ADVISORY GROUPS

WASHINGTON—Industry advisory committees to be retained to act on reconversion matters when Civilian Production Administration assumes functions Nov. 3 total 176, including: Gray Iron Foundry, Iron and Steel, Malleable Iron, Metallurgical and Operations, and Steel Products under Steel Division; Brass and Bronze Foundries, Brass and Bronze Ingot Makers, Brass Mill, Copper Producers, Copper Wire and Copper Mill, under Copper Division; Aluminum, Mining Machinery Manufacturers, Machine Tools, Farm Machinery and Equipment, under respective divisions.

■ NEW STEEL DRUM MAY REPLACE LESS STURDY NAIL KEG

NEW YORK—A cylindrical steel drum, with welded side seam, bottom necked in with a double seam, and fabricated from 24-gage or 26-gage sheet metal, developed during the war, may replace eventually the less sturdy wooden nail keg.

■ FABRICATED STRUCTURAL STEEL SHIPMENTS INCREASE

NEW YORK—September bookings of fabricated structural steel increased to 136,998 tons from 92,684 in August while shipments totaled 53,686 tons compared with 57,541 tons for the same month last year.

■ SCRAP DISPOSAL EXPERTS RETURNING FROM EUROPE

WASHINGTON—Representatives of Overseas Scrap Advisory Committee who have been studying problems incidental to disposal of United States-owned scrap in Europe were due to return late last week by air from England.

■ ADOPTIONS OF APPRENTICESHIP PROGRAMS INCREASE

WASHINGTON—Since V-E Day, 6900 industrial establishments have adopted apprenticeship training programs, or more than double the number reported during the preceding like period.

Strong Tool Industry Is Held Vital

New president of National Machine Tool Builders' Association urges prompt replacement of 600,000 machines over 15 years old. Surplus disposal discussed

AS HE assumed the presidency of the National Machine Tool Builders' Association at this organization's 44th annual meeting, held at Edgewater Beach Hotel, Chicago, Oct. 22 and 23, William P. Kirk, vice president, Pratt & Whitney Division, Niles-Bement-Pond Co., West Hartford, Conn., sounded a warning note.

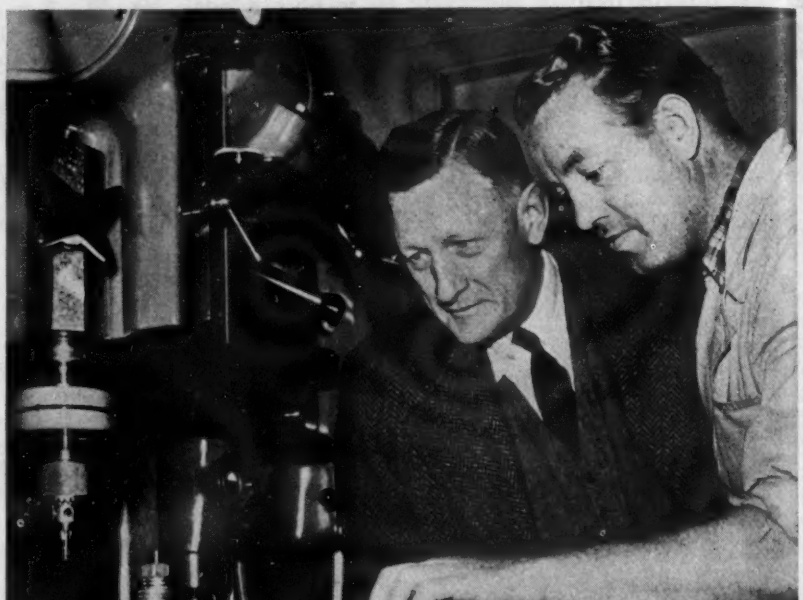
"Never again," he said, "should our country be caught unprepared, as it was at the beginning of World War II."

If common sense is exercised by those in responsible positions, our industrial structure can be made to insure peacetime prosperity and at the same time to insure strength against future aggression, he implied. First, an adequate reservoir of the finest of the surplus standard machines should be set aside by the Army and Navy. There already is a strong tendency to slight that responsibility, and quick action is needed to correct this.

Second, every effort should be made to get all the other good surplus machines into use in manufacturing plants in the United States, thereby pushing into the scrap yards the appalling number of worn out, inefficient machines over 15 years old, which now are in use. There are more than 600,000 of those old machines living on "borrowed time."

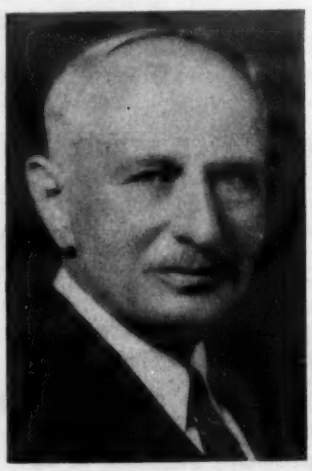
"Idle machines in warehouses," concluded Mr. Kirk, "are a liability and a source of expense. Put to work, they become a source of employment, they produce better goods at lower costs, and they raise the standard of living."

Throughout this meeting it repeatedly was driven home to the more than 350 in attendance that the time has come when the public must be made conscious that machine tools are just as important in peace as they are in war. Joseph L. Trecker, executive vice president, Kearney & Trecker Corp., Milwaukee, retiring president of the association, said that the keynote of the meeting should be: "More goods for more people means more jobs." He urged that every member drive home that truth in his own community—emphasizing that to guarantee this condition in the modern world more and better machine tools are the basic factor.



VISITING SWEDEN: Robert Gaylord, chairman of the board of the National Association of Manufacturers and president, Ingersoll Milling Machine Co., Rockford, Ill., is shown inspecting a machine tool operation in Sweden. Mr. Gaylord reports Sweden is awaiting the United States lead on foreign trade policy and credits, and apparently is heading toward nationalization of much of her industry

"In my opinion," said Mr. Trecker, "it is the failure of industry to educate the public to an understanding of the basic economics behind the volume production principle, that has led to much of our present social unrest. Suppose we define the economics of volume production in terms of jobs.



WILLIAM P. KIRK

"Insofar as a company—by the aid of machine tools and other productive equipment—can cut the cost of its product, it can offer that product at a lower price. As the price goes down, its potential market increases. As its market increases, its volume goes up. As its volume goes up, it can hire more men. That is how jobs are created."

One of the most interesting features of this meeting was the symposium on conditions in Europe, participated in by three men who lately have returned from official missions abroad. These speakers were: George H. Johnson, president, Gisholt Co., Madison, Wis.; Harry Crump, Carboloy Co., Detroit; and Reed M. Andress, second vice president, Barnes Drill Co., Rockford, Ill.

While their general reports still are

held under governmental secrecy orders, it is possible to quote the following words of Mr. Johnson, who served as a member of the U. S. Reparations Commission:

"On the basis of previously acquired reports, we built an estimate on Germany's total metalworking capacity which seemed absolutely incredible. We couldn't believe it was true. In fact we didn't believe it was true until we actually got inside Germany.

"I think I can best sum up the situation in this single statement. When the war ended, Germany—in spite of all the bombing of its industrial plants—still had left in reparable condition, probably more machine tools than we at this moment have in the entire United States.

"When I say machine tools, I mean modern and new machine tools. The German machine tools are good. I won't say that on the average they are quite as good as American-built machine tools. However, the Germans have succeeded in copying and making replicas of many of the finest of America's machines.

"You will be amazed, as I was, at the proportion of German industrial machines that remain operative and undamaged in spite of all the air raids. Our commission estimates that not over 15 per cent have been damaged beyond reasonably simple repair."

Industry Leaders Speak

Other speakers during the meeting included: Tell Berna, general manager of the association, on progress in standardization; Alexander Keller, vice president, Pratt & Whitney, on sales outlook abroad; Louis Polk, president, Sheffield Corp., Dayton, O., on a proposed public relations program for the industry; William L. Dolle, president, Lodge & Shipley Co., Cincinnati, on machine tool color standards; L. D. McDonald, vice president, Warner & Swasey Co., Cleveland, on taxation and profits; Phil Huber, president, Ex-Cell-O Corp., Detroit, on the price situation; and James Y. Scott, president, Van Norman Co., on the existing Washington scene. John S. Chafee, who is about to retire as director, Equipment Bureau, War Production Board, appeared as an honored guest to say "Hail and Farewell."

In addition to President William P. Kirk, the following new officers were elected:

First vice president, Herbert H. Pease, president, New Britain-Gridley Machine Division, New Britain Machine Co., New Britain, Conn.

Second vice president, Al G. Bryant, vice president, Cleereman Machine Tool Co., Green Bay, Wis.

Treasurer, Richard E. LeBlond, president, R. K. LeBlond Machine Tool Co., Cincinnati.

New directors to serve for three years are: Al G. Bryant; William L. Dolle, president, Lodge & Shipley Machine Tool Co., Cincinnati; and Fred W. McIntyre, president, Reed-Prentice Corp., Worcester, Mass.

Materials, Components Shortages Curb Foundry Equipment Builders

Labor problems also contributing to difficulties of manufacturers in producing reconversion equipment, speakers indicate at annual meeting of Foundry Equipment Manufacturers' Association. Tom Kaveny Jr. re-elected president

PRODUCTION of reconversion equipment for the foundry industry is being delayed by difficulties in securing needed materials and components, and by labor problems, it was indicated in discussions at the twenty-seventh annual meeting of the Foundry Equipment Manufacturers' Association at Hot Springs, Va., Oct. 19 and 20.

Emphasis was placed on the need of all industry for fair and adequate labor legislation to meet the present and future problems of the reconversion period.

A forum revealed that foundries are increasing their purchases of equipment for reconversion purposes. Furthermore, with many of them turning their attention toward further mechanization of operations numerous equipment producers see a heavy demand for machines for some time to come.

Opening the meeting, Tom Kaveny Jr., Herman Pneumatic Machine Co., Pittsburgh, and president of the association, outlined the extensive work of the various committees during the year. He indicated that probably the most serious problems ever to face an industry lie ahead. Leicester S. Lewis, Tabor Mfg. Co., Philadelphia, discussed briefly the several possibilities on obtaining relief from OPA ceiling prices.

Activities of the Public Relations Committee, were outlined by Bruce L. Simpson, National Engineering Co., Chicago, chairman of the committee. He reported the committee has conducted an extensive survey of foundries in educational institutions. This report, indicating a definite need for foundry equipment, has been presented to the Surplus Property Administration with the thought that it may aid in the disposal of some surplus to such educational institutions.

TOM KAVENY JR.

The Foundry Equipment Industry Committee on Surplus War Property, Harry T. Worthington, Beardsley & Piper Co., Chicago, chairman, has been set up to help the RFC in any problems pertaining to disposal of surplus foundry equipment, but the total amount of such equipment thus far declared surplus has been small. Latest figures indicate that the value of foundry equipment thus far declared surplus is $2,220,000, of which $643,000 has been sold, leaving a backlog of $1,577,000, which is only a small percentage of total DPC purchases during the war.

William W. Maloney, secretary, American Foundrymen's Association, Chicago, outlined plans for the Golden Jubilee convention and exhibition of the AFA which will be held in Cleveland, May 6 to 10, 1946, and predicted that this will be one of the best attended and most valuable foundry shows ever staged under AFA sponsorship.

The following were elected to the board of directors: Tom Kaveny Jr., E. J. Burnell, the Link Belt Co., Chicago, and Harry T. Worthington, Beardsley & Piper Co., Chicago. At a meeting of the board, the following officers were re-elected: President, Tom Kaveny Jr.; vice president, Otto Pfaff, American Foundry Equipment Co., Mishawaka, Ind.; secretary-treasurer, Arthur J. Tuscany, Cleveland.

Mr. Kaveny announced the association is establishing product groups in the following classifications: Dust Control; Molding Machines; Abrasive Cleaning; Sand Handling; and Blast Cleaning.

Steel Products Warehouse Association Meets Dec. 3-4

The fourth annual conference of the Steel Products Warehouse Association will be held in Hotel Cleveland, Cleveland, Dec. 3 and 4. The conference program will feature outstanding authorities from the steel industry and government agencies with warehouse operations, markets, and price controls under reconversion conditions occupying the spotlight of interest to warehouse and mill sales executives.

Realistic Reconversion Policy Is Needed, Gray Iron Founders Told

Association president, addressing annual meeting, says government agencies should adopt constructive measures not only in the matter of labor relations but also with respect to prices. Cost control and production among subjects discussed

PROBLEMS associated with industrial relations, cost control and improvement in quality of products were among the more important subjects for discussion at the seventeenth annual convention of the Gray Iron Founders' Society Inc. at the LaSalle Hotel, Chicago, Oct. 23-24.

While many of the matters treated related to the difficulties facing the industry today in its efforts to increase the production needed to speed nationwide reconversion, other subjects had significance with respect to the long-term prospects for the gray iron foundries.

Attendance at the convention exceeded 250, the largest in history.

In the president's annual address, Walter L. Seelbach, Forest City Foundries Co., Cleveland, pointed out the need for a realistic policy on the part of government agencies associated with the reconversion program, not only in the matter of labor but also in connection with prices. He read a letter from John D. Small, chief of staff, War Production Board, to the society, advising that WPB had recommended an intensification of referrals by the United States Employment Service to foundries. A communication from John W. Snyder, director, Office of War Mobilization and Reconversion, indicated that a special group of representatives of government agencies concerned with the problem had been appointed to take all possible steps in assisting to alleviate the threatened shortage in gray iron castings.

Emphasizes Need for Research

Howard F. Taylor, senior metallurgist, Naval Research Laboratory, Washington, in emphasizing the necessity of research in the gray iron industry, reported that the Navy is getting under way on a comprehensive research program in gray iron, duplicating in that metal the broad work conducted the past 17 years in steel castings. The purpose is to ascertain facts on which suppliers of gray iron castings for navy use can base their designs.

The subject of sound cost practice was discussed in papers by H. C. Nicholas, Quality Castings Co., Orrville, O.; L. V. Wickson, Almont Mfg. Co., Imlay City, Mich.; and Howard A. Stockwell, Barbour Stockwell Co., Cambridge, Mass. Col. Walter Yeager, the Army Industrial College, Washington, discussed work of that organization and urged appointment of an industry advisory committee to assist the armed forces in readying the nation's productive capacity during peacetime for mobilization in time of emergency. Formation of such a committee subsequently was approved by the society's directors.

Presentation of awards in appreciation of distinguished service in the government and the gray iron foundry industry in wartime featured one of the luncheon sessions. Recipients were: E. P. Buchanan, Pittsburgh Coke & Iron Co., Pittsburgh; F. G. Steinebach, *The Foundry*, Cleveland; D. J. Reese, International Nickel Co., New York; A. D. Hannah, WPB; E. C. Hoenicke, Eaton Mfg. Co., Detroit, and William Kerber, Hanna Furnace Corp., Buffalo.

A panel session was devoted to the subject of industrial relations. E. M. Cushing, supervisor, labor relations, United States Rubber Co., New York, stressed the need for placing responsibility for handling industrial relations in the hands of a capable individual, pointing out that a common-sense approach to the subject, and not national legislation, offers the best solution to the matter.

Facts supporting the contention that the foundry need not, and in many cases is not, regarded as an undesirable place in which to work were offered by Dr. James E. Mullen, Toledo, O. Eric E. Schwantes, director of training, International Harvester Co., McCormick Works, Chicago, pointed out the need for careful selection of the worker, an induction program, and training on the job before the employee is ready to take over his work. Frank O'Malley, personnel director, Ferro Machine & Foundry Co., Cleveland, offered practical suggestions regarding the re-employment of war veterans.

Improvements obtainable in production casting quality and costs were discussed at one session by J. E. Linabury, General Motors Corp., Detroit; C. W. Schwenn, Brillion Iron Works, Brillion, Wis., and Max Kuniansky, Lynchburg Foundry Co. Inc., Lynchburg, Va. Current shortages in gray iron output also were discussed by Senator Alexander Wiley, Wisconsin, at another luncheon session.

H. L. Edinger, president, Barnett Foundry & Machine Co., Irvington, N. J., was elected president of the society at a meeting of the board of directors. Other officers named were: Vice President, George H. Alten, Alten's Foundry & Machine Works, Lancaster, O.; secretary, Howard A. Stockwell, Barbour Stockwell Co., Cambridge, Mass.; treasurer, Homer Britton, vice president, Cleveland Foundry Co., Cleveland.

WPB Guide Shows Lead Time for Deliveries

TIME lag for procurement of selected material and equipment, compiled by the War Production Board, ranges from normal to a maximum of one and one-half years above normal. The data indicate certain textile machinery, farm machinery, tool, safety and technical equipment manufacturers will maintain a high rate of operations for two to five years, since it is estimated a normal lapse of time between the date of receipt of order and the shipping date will not be established in those industries for several years.

Conditions in specific localities, special quantities or particular specifications will vary the lead time given in the report.

Lead time for finished steel is 30 days prior to first day of the month of rolling. Deliveries, however, vary from 4 to 30 weeks depending on the item, specifications, quantities, locality and mill schedules. No generalization can be made since this is a period of order book readjustment.

Under the general classification of tools, the lead time is normal in abrasives; cranes; lathe chucks; files, rasps and vises; foundry supplies; gages and precision hand tools; heat treating furnaces; hoists; jigs and fixtures; and metal cutting tools. Lead time is extended to a range of 4 to 52 weeks for general machine tools, 6 weeks for large and 24 to 36 weeks for average hydraulic forming presses, 24 to 52 weeks for power shears and brakes, 12 to 52 weeks for die casting machines, and 6 to 24 weeks for mechanical presses.

Lead time is now extended to 104 weeks compared with a prewar lapse of 26 weeks for cotton and woolen weaving and yarn preparing machinery; to a range of 8 to 17 weeks for laboratory instruments and equipment; 17 to 76 weeks for X-ray equipment and supplies; 4 to 13 weeks for signal and alarm equipment.

It is estimated lead time will be normal in 1947 for integral horsepower motors, single-phase up to 5 horsepower; in the fourth quarter of next year for chain, portable compressors, concrete block-making machinery, fractional horsepower motors, gear type motors, pumps, and heavy woodworking machinery; in the third quarter of next year for brewhouse machinery and bottling equipment, conveyors and conveying machinery, electroplating equipment, motors and generators of less than 200 horsepower; in the second

quarter for low-pressure air conditioning and refrigeration equipment, food machinery, scrap baling presses, industrial power trueks; and in the first quarter for large type compressors, motors and generators of 200 and more horsepower, paint spray equipment, speed reducers, welding equipment, and wireworking machinery.

Automotive materials are in fair supply since all items will be available within a normal lead time by June of next year, the tightest being attachment third axles, trailers and light trucks. It is estimated the lead time will be normal by April for batteries, liquid-cooled diesel and gasoline engines; by March for air-cooled gasoline engines up to 35 horsepower; by February for transmissions; by January for friction bearings, camshafts, crankshafts, magnetos, piston rings, and poppet valves; by December of this year for axles, carburetors, wheels and drums; by next month for diesel fuel injection equipment. Lead time is now normal for drive shafts, radiators and universal joints.

Sheet metal building products will attain a normal lead time by March of next year for stock items and by April for engineered items. Present lead time of tanks is 3 to 9 weeks and will be normal by July. Edge and hand tools and hardware items, normally obtained from stock, carry lead times now ranging from normal for a few items to 26 weeks for power saw blades, 24 weeks for cross cut saws, 16 weeks for auger bits, ballast forks, hangar hardware and track and hangers; and 12 weeks for anvils, portable forges, tool handles, wheelbarrows, automatic door operators, and turnstiles.

Prewar lead time for construction machinery generally was 2 to 4 weeks and is now 4 to 8 weeks. However, normal lead time will not be attained until October of next year for angledozers and bulldozers; rotary tractor and truck-mounted brooms; cranes; walking-type draglines; portable water well and blast hole drills, churn type drilling machines; road maintainers; motor graders; power control units for tractors; road rippers; road rollers; scarifiers; motor pick-up sweepers; tracklaying tractors; wheel type logging wagons; crawler trailer wheels; and tractor-mounted winches.

WPB Stresses Need for Additional Foundry Workers

Job security and rapid up-grading of workers are the principal inducements with which the foundry industry expects to recruit additional manpower to offset current lagging castings production, J. D. Small, chief of staff, War Production Board, said last week.

Castings production is running at a 9 million ton annual rate and must be lifted to about 12 million tons annually.

The gray iron castings industry now employs about 260,000 workers, but 60,000 to 70,000 additional employees are required with 20,000 needed immediately.

Wickwire Spencer Made Division of Colorado Fuel & Iron with Merger Formally Completed

DENVER

FORMAL merger of the Wickwire Spencer Steel Co, New York, and the Colorado Fuel & Iron Corp., Denver, recently approved by stockholders of both companies, was effected last week at a meeting of the board of directors.

E. Perry Holder, who has been president of Wickwire Spencer Steel, was elected president of the merged company which will be known as the Colorado Fuel & Iron Corp. W. A. Maxwell, who was president of Colorado Fuel & Iron is retiring. Charles Allen Jr., head of Allen & Co., New York investment firm, and chairman of both Wickwire and Colorado Fuel & Iron, continues as chairman of the new company. L. F. Quigg, executive vice president of Colorado Fuel, continues in that post while H. C. Crout, treasurer of Colorado Fuel, and D. C. McGrew, secretary of Colorado, continue in the same capacities with the new company. J. D. Sullivan, N. H. Orr and Douglas Millard, all vice presidents of the Colorado company, retain their positions. A. G. Bussmann and R. T. Dunlap, vice presidents of Wickwire, also retain their posts in the new setup, while Franklin Berwin, a director and secretary of Wickwire, and A. C. Bekaert, treasurer of Wickwire, have been named vice presidents of the new company.

The merged companies have a capacity for production of 1,345,000 gross tons of steel ingots and 1,227,100 gross tons of pig iron.

Another development in connection with the completion of the merger was announcement that the Wickwire Spencer Division has purchased the Coburn Trolley Track Co., Holyoke, Mass.

Recently Colorado Fuel & Iron Corp. has figured prominently as a possible purchaser or lessee of the government-owned steel plant at Geneva, Utah.

Kaiser Confident West Can Support an Auto Industry

LOS ANGELES

Belief that the West can support a full-fledged automobile industry was expressed last week by Henry Kaiser, West Coast industrialist and chairman of the Kaiser-Frazer Corp., before the Advertising Club of Los Angeles.

Mr. Kaiser said he and others have explored the possibilities of integrating the Geneva and Fontana steel plants in an independent western steel syndicate but it is felt that any public offering of securities must be postponed.

TRANSITION TOPICS

WAGES—PRICES—Organized labor's drive for wage increases to maintain wartime weekly pay and lack of national policy on wages and prices bring threat of industrial strife nearer. Auto workers vote for strikes. Steel producers reject union's demand for $2-a-day advance. See page 69.

MACHINE TOOLS—Prompt replacement of machine tools more than 15 years old urged by new president of Machine Tool Builders Association. See page 74.

SURPLUS PLANTS—Hearings on disposal of government-owned iron and steel plants to open before Senate committees Nov. 5. Chief interest centers on Geneva plant. See page 78.

AIRCRAFT—Development of propjet, using both propeller and jet thrust, opens broad new field in airplane propulsion. See page 92.

UNDERWATER TORCH—Salvage and construction people foresee lively future for new underwater metal cutting method in their fields. Simple equipment also greatly increases cutting speed in open air. See page 102.

"INDUSTRIAL LOGISTICS"—Art of calculating and getting maximum utilization from materials handling equipment is a heritage of war experience. See page 104.

VERSATILE ROBOT—Control system for handling 39-function cycle of machine, which gives precise, repetitive performance at high speed over full working range, promises to eliminate operator mistakes. See page 106.

Senate Hearings on Disposition of Surplus Steel Plants Start Nov. 5

Chief interest will center on government-owned Geneva Steel plant. Senators favor United States Steel as operator. Corporation officials will be questioned as to reasons for withdrawing offer to consider lease or purchase of facilities

THREE Senate committees will open joint hearings Nov. 5 on the problems and policies involved in disposing of government-owned iron and steel plants. These are the Senate Military Affairs Committee, the Special Committee on Postwar Economic Policy and Planning, and the Special Committee on Small Business.

Under the chairmanship of Sen. Joseph C. O'Mahoney (Dem., Wyo.), and with Sen. James E. Murray (Dem., Mont.) taking an active interest, the principal purpose of the hearing will be the finding of a formula by which government-owned iron and steel plants in the West may be operated to promote industrialization in the western states.

Chief interest will center on disposition of the $200 million Geneva plant at Provo, Utah. Western senators, needled by insistent demands from constituents, regard Geneva as the key to industrial growth in the West, and they lean strongly to the idea of interesting the United States Steel Corp., which built and operated the Geneva property under contract with the Defense Plant Corp., in acquiring and operating it over the long peacetime period ahead.

U. S. Steel executives, invited to attend the hearings, will be questioned closely as to why they withdrew, last August, their proposal to purchase or lease the Geneva works. Senators pondering the matter feel that the Corporation is a logical potential operator for three reasons: It is thoroughly familiar with the Geneva plants; it is fully organized and financially prepared to take over the load; and it already has a going steel business in the Far West.

Present indications are that the senators will give scant consideration to the effort of the attorney general to influence the sale of iron and steel plants to small rather than large interests under the antimonopoly provisions of the Surplus Property Act. In fact, the senators showed clearly during the aluminum hearings how they feel on this point. In trying to develop a means of keeping the government-owned aluminum plants in operation after Nov. 1, the date on which cancellation of existing government contracts is to become effective, Senator O'Mahoney asked this point-blank question of I. W. Wilson, vice president, Aluminum Co. of America:

"Are you at this moment willing or unwilling to enter into negotiation with RFC in an effort to reach an amicable interim understanding before the first of November, the effective date of the cancellation?"

"We are always willing to sit down with any government agency in an attempt to work things out," replied Mr. Wilson. Thereupon Senator O'Mahoney got into communication with Sam Husbands of the RFC and arranged an appointment between the latter and Mr. Wilson for 9 o'clock the next morning.

In addition to representatives of U.S. Steel, those invited to appear at the iron and steel hearings will be questioned about the future of Geneva should that property be disposed of to the Kaiser or Colorado Fuel & Iron interests.

Another prospective deal to be explored is that under which Reconstruction Finance Corp. might advance funds for construction of a cast iron pipe plant at Daingerfield, Tex., to operate on pig iron from the government-financed blast furnace which was built there by the Lone Star Steel Co. but never operated. Lone Star officials, at RFC request, now are investigating the potential cast iron pipe market that could be served by a plant at Daingerfield.

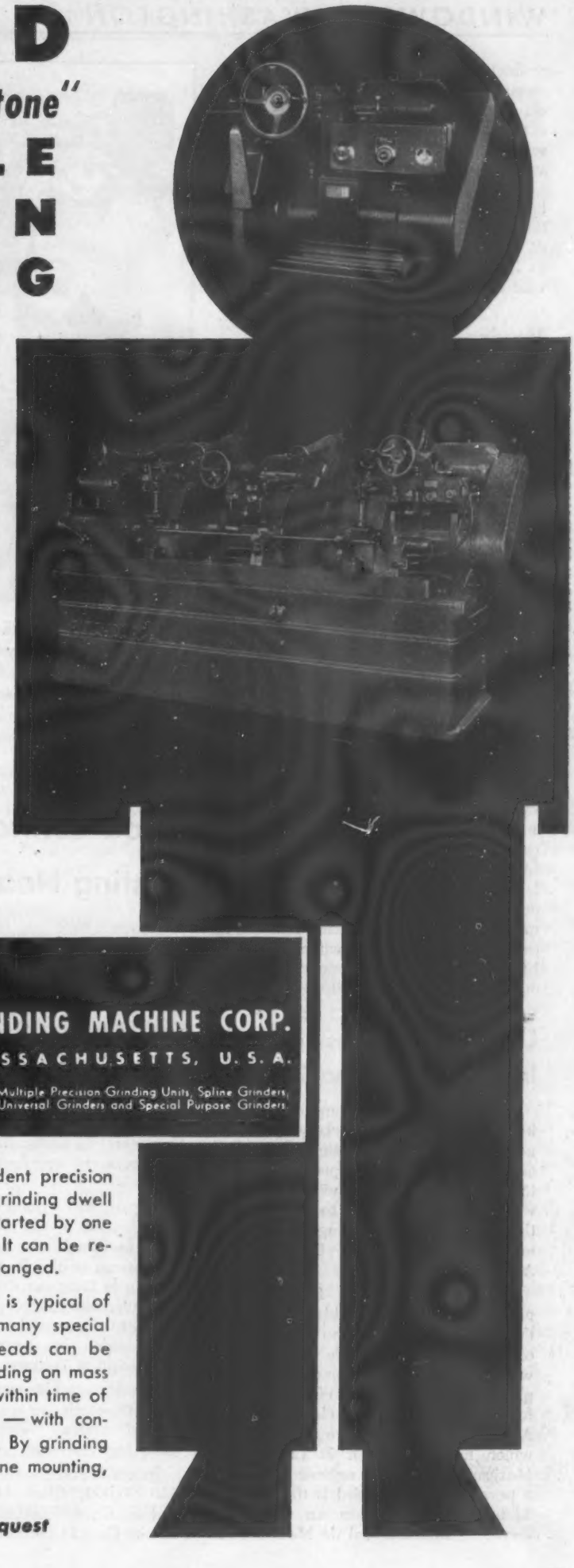
OPPOSES ARMY-NAVY MERGER: Sen. Edwin Johnson (Dem., Colo.), left, and Secretary of Navy James V. Forrestal look over a chart showing proposed organization for national security. Secretary Forrestal testified before the Senate Military Affairs Committee in opposition to the proposed merger of the armed services. NEA photo

$50 Million Loan Granted Netherlands Government

Announcement by Export-Import Bank that a $50 million credit has been granted the Netherlands is coupled with the explanation that proceeds of the loan are to be largely expended for procurement of commodities and services already requisitioned and approved under lend-lease, but not contracted for before V-J Day.

Commodities and services covered are transportation equipment, rubber products, including tires, allied products; footwear, leather, hides, textiles, textile raw materials, coal, lumber including railroad cross ties; pulp, paper and paper

THIS HEAD PUTS ITS *"Nose to the Grindstone"* FOR MULTIPLE PRECISION GRINDING



To bring precision grinding the advantages which multiple tooling and combined cuts have given machined work in mass production, Fitchburg engineers put their heads together.

The result, the Fitchburg independent standard Bowgage Head, completely self-contained, and enabling one machine to perform as many operations as it has heads with which to grind.

For instance, a machine can be arranged for plunge-cut grinding one end and the second head set up for hydraulic traversing for longitudinal grinding, while the number three head is also plunge-cut grinding the other end. This is advantageous on gun barrels or long spindle type pieces where three operations are necessary — and all three operations will be performed within the time of the longest single operation!

If you have an "axe to grind" with your current production speeds and costs, let Fitchburg engineers show you how the Fitchburg method can be applied to your special problem. No obligation. Write today !

FITCHBURG GRINDING MACHINE CORP.
FITCHBURG, MASSACHUSETTS, U.S.A.
Manufacturers of — Bowgage Wheelhead Units, Multiple Precision Grinding Units, Spline Grinders, Cylindrical Grinders, Gear Grinders, Bath Full Universal Grinders and Special Purpose Grinders.

THE HEAD. *The Bowgage Head* is a completely independent precision grinding unit. It has rapid traverse, slow grinding feed, grinding dwell or spark out, and rapid return to starting position — all started by one push button. It is precise to .0002", minimizing spoilage. It can be removed and remounted for other work, if operations are changed.

THE BODY. *The Fitchburg Triple-Head Machine* illustrated is typical of the functional engineering and rugged construction of many special machines into which independent Fitchburg Bowgage Heads can be built to cut costs through multiple automatic precision grinding on mass production. It grinds three dimensions at the same time, within time of longest single grinding operation, and in one handling — with consequent saving in time and reduced danger of spoilage. By grinding several dimensions automatically on the same piece, at one mounting, it releases operator for other work.

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products, building materials, chemicals, metals, typewriters and other office machinery; medical products, seine twine and other fishing textiles, foods, feeds, seeds, fertilizers, agricultural machinery and ocean freight.

Government procurement facilities may be utilized until Nov. 2, it was stated, but the Netherlands government has indicated an intention of making part of its loan purchases through American private trade channels.

Mexico Requires Import Permits for More Articles

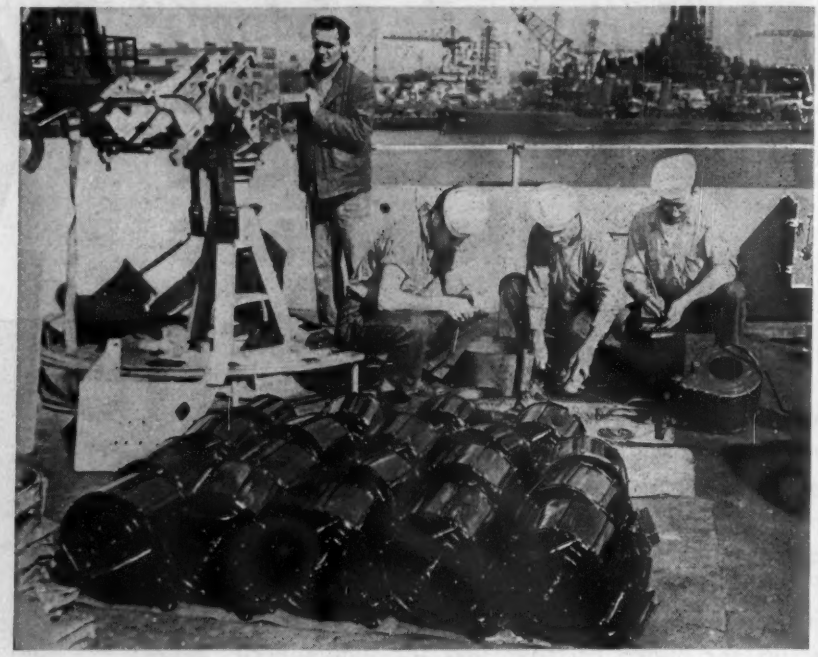
Mexico has added various iron and steel products to the list of commodities requiring import permits into Mexico.

Included are: Iron or steel wire, not tinned or galvanized, up to 10 millimeters in diameter; same with fasteners, rivets or binders for fastening bundles; tinned or galvanized, up to 1 millimeter in diameter; same, flat or with perforations to reinforce packing cases; flutings, teeth or finished designs, symmetrically spaced on all or part of their surfaces; tin plate in sheets, painted, stamped, embossed, or not painted, stamped or embossed; iron or steel sheets, not tinned or galvanized, of greater than 15 centimeters, not specified; same, smooth galvanized, up to 1 millimeter thickness; same, greater than 2 millimeters but not more than 4; same of more than 4; same, corrugated, galvanized or ungalvanized; up to 4 millimeters; tin plate containers, up to 5 liters capacity, without labels or inscriptions for use in packing foods; same with labels or inscriptions of any form; iron or steel tanks up to 2500 liters capacity; or over; lids, covers, bases and lateral iron or steel structures when proven to be intended for construction of tanks of over 2500 liters capacity.

U. S. Firms Interested In Mexican Companies

Three United States corporations have become interested financially and technologically in new Mexican companies and have arranged to provide training to young Mexicans who will become key workers in the plants to be built by these companies, according to announcement by the Office of Inter-American Affairs.

One is Westinghouse Electric International Co. which holds slightly less than 10 per cent of the share capital of Industrial Electrica de Mexico S. A., which is to build a new $10 million plant 20 miles outside of Mexico City for the manufacture of electrical goods. Another is Celanese Corp. of America which has an interest in La Celanese Mexicana S. A., just organized to build a new plant. The third is the Reynolds Metal Co. which has an interest in Reynolds Internacional de Mexico S. A.



PRESERVING FIRE POWER: Crew members of the cruiser *U. S. S. BROOKLYN* apply preservative coating to magazines of 20-millimeter automatic cannon for "dehumidified storage" below decks. Keeping fire power ready for emergency action is the aim of the Navy's huge fleet preservation program in which thousands of vessels will be maintained in berthing areas as a reserve fleet. NEA photo

Flood Control, River and Harbor Projects Costing Nearly $1.5 Billion Authorized

RIVER, harbor and flood control projects on which the Civil Works Divisions of the United States Army Engineers are ready to start work involve an estimated outlay of $900,615,500. Additional projects of a similar nature, to cost $593,954,965, will be ready by late spring of 1946. All of these projects have been authorized by Congress and work can be started, directly by the Engineers, or under contract, as soon as the necessary appropriations have been made.

In part, the request for appropriations is embodied in the engineer deficiency estimates which now are in the hands of the Bureau of the Budget for early submission to Congress. Other appropriations to implement the program will be contained in the annual request of the Engineers which will be submitted to Congress early in January.

Flood control projects ready now number 138 which are scattered all over the United States. The more important ones, together with estimated cost, are:

Buggs Island Reservoir, Va. and N. C., $30,900,000; Clark Hill Reservoir, Ga. and S. C., $35,300,000; Allatoona Reservoir, Ga., $16,335,000; Buffalo Bayou, Texas, $15,812,900; Bull Shoals Reservoir, Ark., $47,000,000; Markham Ferry Reservoir, Okla., $19,295,000; Fort Gibson Reservoir, Okla., $19,007,000; Harlan County Reservoir, Nebr., $31,000,000; Osceola Reservoir, Mo., $28,500,000; Garrison Reservoir, N. Dak., $130,000,000; Wolf Creek Reservoir, Ky., $44,394,900; Center Hill Reservoir, Tenn., $19,982,600; Bluestone Reservoir, W. Va., $16,126,900; Conemaugh River Reservoir, Pa., $21,366,000; Whittier Narrows Reservoir, Calif., $16,983,000; Kings River and Tulare Lake Basin, including Pine Flat Reservoir, Calif., $19,500,000; Folsom Reservoir, Calif., $18,474,000; Detroit Reservoir, Oreg., $27,650,000.

Of 75 additional flood control projects to be ready in late spring of 1946, the more important, with estimated cost, are: Whitney Reservoir, Texas, $20,000,000; Lookout Point Reservoir, Oreg., $24,029,000.

Of 22 rivers and harbors projects ready to proceed immediately, the most important involved work in the Mississippi between Minneapolis and the Missouri, coming to some $22,300,000.

Of 87 rivers and harbors projects

which will be ready by late spring of 1946, the most important are: Alabama and Coosa rivers, Alabama and Georgia, $59,780,000; Neches and Angelina rivers, Texas, $27,750,000; Missouri river between Kansas City and Sioux City, Iowa, $16,400,000; Ohio river lock and dam construction, $20,230,000; Illinois Waterway, Ill., $26,723,700; Columbia river, Oregon and Washington, $49,090,000; Snake river, Oregon, Washington and Idaho, $58,288,000.

Directory of Commodity Specifications Revised

Department of Commerce has ready its third edition of the "National Directory of Commodity Specifications" originally published in 1925, according to announcement by the Bureau of Standards.

In this 1300-page volume is listed and briefly described more than 35,000 commodity standards and specifications formulated by trade associations, technical societies and organizations, as well as the standardizations and specifications of agencies that represent the federal government as a whole, it is stated.

The book is designed to interest manufacturers who produce anything covered by government specifications, purchasing agents, and others. It is intended to serve as a ready reference work in the field of standards and specifications.

The directory is designated officially as Miscellaneous Publication 178, and copies, bound in green buckram, may be obtained from the Superintendent of Documents, Washington, at $4.00 each.

400 Patents Listed for Sale or for Licensing

Some 400 patented methods, products and devices have been placed on the Register of Patents Available for Licensing or Sale, according to the Department of Commerce. The register was established June 1. Awaiting action are an additional 225 requests for listing, it was stated.

Listings of patents on the register range from technical and complicated equipment used in modern industry and science to simple methods and devices for providing many commonplace articles and means of human comfort, the announcement stated.

Bill Provides for Stockpiles Of Strategic Materials

Senator Edwin C. Johnson, Colorado, has introduced S. 1481 for stockpiling of strategic metals and minerals, and for purchase of such strategic materials for stockpiling. The bill has been referred to the Senate Military Affairs Committee.

A feature of the bill provides for establishing a Strategic Materials Stockpiling Board.

Positive Approach to Problem of Full Employment Asked by NAM

Mosher tells congressional committee correction of three economic errors necessary to prevent depressions: (1) Mismanagement of money and credit system; (2) perpetuating special privileges; (3) prevention of capital flow in job-making activities

POSITIVE rather than a "defeatist" approach to full employment was urged upon Congress by Ira Mosher, president, National Association of Manufacturers, who declared that industry depends for its very economic existence "upon America being a nation of full employment."

"An expanding economy brought about by ever increasing production, and a national income in excess of any previously attained, are the goals that must be attained to bring true full employment and high living standards," he said.

It will take "more than a slogan" to reach those goals, Mr. Mosher said as he suggested a specific legislative program to correct the three economic errors responsible for depression and mass unemployment.

These errors, he said, are mismanagement of the money and credit system, granting of perpetuating special privileges, and prevention of an adequate flow of capital into productive job-making activities.

Mr. Mosher, who is president of the Russell-Harrington Cutlery Co., Southbridge, Mass., testified before the House Committee on Expenditures in Executive Departments on the Full Employment Bill already passed by the Senate.

Tax Reduction Urged

High on the list of recommendations for congressional action was Mr. Mosher's plea for reductions in income taxes and for a federal budget, exclusive of debt retirement, of not more than $15 billion when war expenditures are ended. Such tax reductions and government savings, Mr. Mosher contended, were the principal factors affecting "an adequate flow of private capital into productive job-making activities."

Commenting on the Full Employment bill being considered by the House committee, Mr. Mosher said there could be no quarrel with its objective, but that even if it were effectively amended to eliminate its "defeatist" approach to unemployment, it would merely be a measure which placed responsibility for full employment upon the federal government, and "does nothing to bring about the realization of that goal."

Mr. Mosher said the government has a definite responsibility to take positive action which will prevent the "only three economic developments" which can halt prosperity and "throw our economy into a depression with mass unemployment."

He recommended that Congress appoint a special committee of experts to study and report currently and specifically on needed legislative changes to correct management of money and credit, and to guide banking authorities in formulating their policies.

Under the heading of special privileges, Mr. Mosher urged that "all monopolistic conspiracies, whether by management, labor, or any other element of our economy, be eliminated promptly."

"The free flow of capital into job-making enterprises," Mr. Mosher said, "could best be stimulated through a taxation program that will reduce and hold income taxes at a level that will not discourage individual initiative, eliminate burdensome excise taxes and capital gains taxes, and setting taxes on corporate business profits below the point at which investment is discouraged."

Assails "Defeatist" Approach

Mr. Mosher contended that the "full employment" bill, as it stands before the House, was "defeatist" in its approach to the problem in that it was based upon the thesis that in the future, "no matter what we do, there will be times when government must spend and invest in order to make jobs."

The provision of the bill which calls for an annual forecast by the President of "Production and Employment," Mr. Mosher said, was based upon a false assumption of definite and determinable relationship between gross national product and employment, and that furthermore, it is "simply not possible" to make correct overall business forecasts for 18 months in advance.

Mr. Mosher said the record since 1900 showed that the nearest approach made thus far to full employment had been without benefit of government spending. During the first 30 years of this century, he said, "we dropped below full employment by more than 4 per cent, in only one year (1921)."

During the period from 1930 to the second World War, when government was making "strenuous efforts" to create employment, "we got within 10 per cent of full employment in only one year (1937, when we fell short by 9.2 per cent), and this was not as good as the worst year in the preceding three decades."

Bethlehem To Expand Coast Plant

New open hearth and additional finishing facilities to be built at Los Angeles at cost of $8 million. Further expansions contemplated

C. F. BORDEN

RICHARD L. ERLIN

Mr. Borden, former manager of general sales service department of Geneva Steel Co., has been named district manager of sales for northern California for Kaiser Co. Inc., Iron and Steel Division. Mr. Erlin has been appointed manager of sales service for Kaiser

SAN FRANCISCO

BETHLEHEM STEEL CO. has announced the beginning of a long-term expansion program on the West Coast, confirming reports of several months duration that such a move would be taken.

The first step in the program will be undertaken immediately with the addition of a new open hearth and with erection of additional finishing facilities. Both expansions will be at the company's plant at Los Angeles, and will cost approximately $8 million. They are in addition to Bethlehem's recent announcement of a new $500,000 warehouse.

Taken along with United States Steel Corp.'s plans to build a $25 million rolling mill at its Columbia Steel Co., works at Pittsburg, on San Francisco Bay, these major expansions indicate that the two big steel firms intend to push hard their postwar competitive position on the West Coast despite Henry Kaiser or others who had hoped to dominate the field by acquiring and expanding war-built steel facilities in the West.

Bethlehem, which since 1930 has been acquiring and building steel properties at San Francisco, Seattle and Los Angeles, plans to spend at least another $8 million and perhaps more, as soon as postwar conditions allow it to proceed with its long-range expansion program.

The new open hearth will be of 4000-ton capacity a month and will be in addition to three present open hearths. The new facilities are expected to provide 14-inch ingots weighing 3400 pounds, compared with present capacity for making 10-inch ingots weighing 1560 pounds.

The new finishing mills will provide a full range of wire rods; a wide range of bars including rounds, squares, flats, angles, spring steel and reinforcing bars; and a wire department for production of bright wire in 20-gage and heavier.

The new bar mill facilities will include a 30-inch, three-high billet mill and a combination 12-inch, 10-inch, 8-inch bar mill. This improvement will make obsolete the present 12-inch mill extending the range of products above and below. The present mill rolls up to 1 3/4-inch rounds, whereas the new equipment will roll up to 2½-inch rounds. It will also roll down to 0.207-inch, the smallest rod dimension.

The wire mill will occupy the first bay of the warehouse at the Los Angeles plant and an addition to be built adjacent to it. Another warehouse bay will be built on the north side to compensate for the space taken by the new mill.

The present program calls for three new buildings, plus the warehouse expansion. The two bar and rod mill buildings will cover 119,000 square feet. The warehouse additions, including the new wire section, will cover 64,400 square feet, and there will be a building for wire storage covering 10,000 square feet.

Eaton Sees Financing as Doubtful Factor in Development of California Steel Industry

LOS ANGELES

A SOUTHERN California steel industry depends upon a reasonable price for the Kaiser Steel Co. Fontana plant and, to a lesser extent, the Geneva plant, in the opinion of Cyrus Eaton, industrialist and banker, Cleveland.

Mr. Eaton, who aided in financing the Kaiser-Frazer automobile venture, talked to reporters in Los Angeles last week after his arrival to look over the steel situation there at behest of Henry Kaiser.

Three essential requirements for establishing a permanent steel industry in Southern California, he said, are: Good raw materials at low cost—"I think you have that out here;" second, access to markets—"You can have that, I believe;" third, financing.

As to financing: "Your local steel industry must be founded on a basis that will make it competitive with old established steel organizations farther east.

"The Fontana plant cost the government more than $100 million. If the government uses that as a basis of sale it cannot be operated economically as a peacetime industry. Wartime construction costs were of necessity excessive."

Meanwhile, Mr. Eaton said, Mr. Kaiser is going ahead with production. He emphatically said that Los Angeles is bound to grow in population and industrialization.

He was not so certain as to the future of the Geneva plant although he did not reject it as a peacetime development.

Ask Early Action on Western Plant Disposal

SALT LAKE CITY, UTAH

With a completely integrated light metals industry in the West as its objective, the Western States Council met here and took action to press appropriate government agencies for immediate action with reference to the disposal of government plants in the western states.

"We want to tie the light metals in-

dustry into the western economy" stated Christy Thomas, Seattle, president, "from the raw materials to the finished products—the pots and pans." The council representing 11 states urges the Surplus Property Administration to act at once on offers from private industrialists for sale or lease of the eight government-owned aluminum plants in the West.

Southern Californians Expect Employment Rise

LOS ANGELES

Rising optimism as to the progress of reconversion was voiced emphatically by Southern California industrialists recently in answers to a questionnaire sent out by the Committee for Economic Development, Los Angeles.

Morris B. Pendleton, president, Plomb Tool Co., and regional vice chairman of the CED, reveals that:

"Steel companies and other industries said that layoffs are comparatively few and that employment needs are steadily increasing as business accelerates.

"'From this survey, we believe that employment here will be double present figures by the middle of 1946.

"As a matter of fact, employment is not the major problem at all. Fundamentally, the main hurdle is distribution.

"The biggest part of reconversion may prove to be that of reconverting the attitudes of workers, making them realize that industry is no longer on a cost-plus basis and that if products aren't produced at prices customers are willing to pay, then jobs won't last very long."

California Prices on Oil Country Pipe Increased

An increase in warehouse and jobber ceiling prices for oil country tubular goods in California to the levels provided elsewhere in the United States was announced by the Office of Price Administration recently.

The increase was authorized to relieve a shortage of oil country goods in California, where prices have been from five per cent to seven per cent below levels in other parts of the United States.

Oil country tubular goods are: Oil well casing, tubing, drill pipe and drive pipe.

Warehouse and jobber sellers of oil country tubular goods were authorized to use as their ceilings the maximum prices appearing in price list No. 24 of the Oil Well Supply Co., distributor of National Tube Co. Previously, ceiling prices were the sellers' own selling prices on April 16, 1941, provided they did not exceed those in price list No. 24.

While the change is applicable to all resellers throughout the nation it was in California principally that ceiling prices were below those listed in price list 24.

Future of California's Metals Mining Industry Is Uncertain

Accounted for approximately $100 million annually before the war; gold contributed nearly half of total. Difficulties arise from shortage of labor, high wages in competing industries and scarcity of equipment and materials

SAN FRANCISCO

PROSPECTS for California's metal mining industry in the immediate postwar years are uncertain. In some divisions of the industry—gold and quicksilver to name two—the outlook is not promising.

Because metal mining is an important factor in California's economy, the well-being of the industry affects the position of a large number of allied enterprises. In prewar years metal production accounted for nearly $100 million annually, of which gold mining contributed nearly half.

The reasons for difficulties in reverting mining from a wartime to a peacetime basis are many, but two or three causes stand out. Perhaps the biggest single cause is the continuing shortage of labor and the allied problem of wages. Secondly there is the current shortage of equipment and materials; this is especially a big factor in putting into operating condition mines which had fallen into disuse during wartime shutdowns. Finally, in the case of some metals, large stockpiles were built up during the war and until the oversupply is worked off mining will be unprofitable.

The gold industry, partly because it is the biggest of the state's metal-mining ventures, is suffering most. During the war period and up until three months ago, gold mining except in small operations, was forbidden by the War Production Board. The larger mines were shut down and in many cases were flooded.

Labor Shortage Continues

When WPB controls were withdrawn, the gold mine operators immediately began searching for manpower, but with small success. During the shutdown, their skilled employees had scattered to war industries, such as shipyards, and even after being tracked down they were unwilling to go back to lower-paying jobs in the mines as long as high wages were available in the cities.

This situation is continuing. Many of the state's gold mines have been unable to reopen at all, and those that have resumed mining are operating at only 25 per cent to 50 per cent of capacity.

Labor shortages have been felt most severely by the underground, or lode, mines. Some of the bigger dredging companies operated during the war on flood control projects or other federal work and thus were able to keep at least a part of their working forces intact.

The lode mines, in addition to labor, also have the problem of rehabilitating their diggings, especially those which were flooded. Timbers for shoring mine stopes are hard to get and quality is poor. Other materials also are scarce. Congress soon may consider legislation which would provide funds for gold mines which saw their resources pared during the shutdown and now have fiscal problems in addition to their operating troubles.

Mining of iron ore in California, which increased sharply during the war following completion of the Fontana steelworks, will depend largely on future operations at Fontana. The largest known deposit of iron ore is in the southeastern part of the state at Eagle Mountain. It is estimated to contain between 50 million and 70 million tons of ore, a reserve sufficient to supply the Fontana plant for a number of years.

Explore New Sources of Ore

Other ore bodies in the state are smaller, but new sources are being explored and it is believed California will be self-sufficient in iron for some time.

The California quicksilver industry, which boomed during the war, has slackened its operations sharply in recent months and operators fear it may be as long as ten years before the industry can get back into normal production. Skilled quicksilver miners are scattered now and will be difficult to reassemble once activity increases. Moreover, there now is a large stockpile of the metal in the United States.

California never has been a big producer of copper, lead and zinc, but during wartime output of these metals increased sharply from peacetime levels. Now, as demand falls off, it appears likely that operations also will decline.

Of other lesser metals, such as chromite, manganese, molybdenum and tungsten, for which there was heavy demand in wartime, prospects now are none too bright. It is believed that even small price declines for these metals will halt their production.

Magnesium production, and aluminum to some extent, apparently will be governed by demand factors. At present supply of these metals in the United States far exceeds demand, and observers think it may be many years before a parity is reached.

that haunts a machine tool designer's life

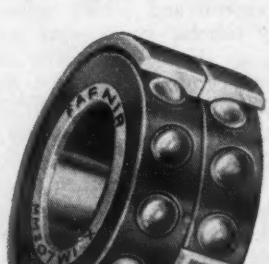
The "thing" is not a ghost or a nightmare. It's real as life. It's the vicious chatter, the destructive vibration that kills the very quality of work for which the machine is designed. Not right away but after the machine is in the customer's plant. The villains that perpetrate the "thing" are, of course, bearings that can't take the load and hold their accuracy.

That's the sort of situation that calls for Fafnir and that Fafnir responds to with a specific designing job, such as the "MM Series" of ball bearings. Out of the extreme demands of machine tool designers for utmost rigidity, load capacity and long life, came new refinements in ball bearing design. The demand load of the machine tool and the work limits can be perfectly matched with precisely determined pre-loads. And the use of specially heat-treated steels and ultra-precision grinding of raceways provides far greater rigidity and consequent accuracy over a far longer life expectancy. Operating limits have been raised for this MM Series as high as 50,000 r.p.m. in actual service and have operated at these speeds for as much as 8,000 hours.

That's the kind of cooperative design engineering which Fafnir has practiced in industry after industry. It's the reason for "the most complete line of ball bearings in America" . . . and for the ball bearing engineering staff at home and in the field devoted to more and more of the same design cooperation. It's the best possible reason for saving time by putting a bearing problem up to Fafnir *first*. The Fafnir Bearing Company, New Britain, Connecticut.

FAFNIR **BALL BEARINGS**

Most Complete Line in America



By A. H. ALLEN *Detroit Editor, STEEL*

MIRRORS of MOTORDOM

Packard's new assembly lines soon to go into operation. First postwar models put together on "interim" lines. General Motors' tentative schedules call for acceleration through to next March, provided no interruptions occur

DETROIT

TWIN assembly lines 400 feet long, each with eventual capacity of 35-50 cars per hour, are being installed in a three-story structure at the Packard plant, space which only 30 days ago was an open courtyard. Open from ground floor to roof, the assembly building has mezzanines from which bodies and fenders will be dropped on chassis moving down the lines. The new lines are a distinct departure from conventional automotive practice in that they have pits between the tracks in which assemblers may work comfortably on the underside of the car. The pits are well lighted and ventilated and are fed parts and supplies from lateral tunnels.

The first line should be in operation this week, while the second will come along later. Meanwhile a few four-door sedans are being put together on "interim" lines, or on sort of catch-as-catch can basis, for display purposes. Other phases of the Packard plant reconversion are moving along smoothly and are quite extensive, something like $10 million being spent this year alone, and another $5 million being earmarked for next year.

A large assortment of government machinery had to be moved out of various plants, and the speed with which government officials have handled this work is one of the brightest spots in the entire program, according to Packard officials. There are still some 2700 machines to be skidded out of their present positions, and they are moving at a rate of about 110 daily.

Packard Uses Briggs Bodies

First shipments of bodies were received from the Briggs Meldrum plant at Packard on Oct. 12. While they had nine parts missing as a result of delayed shipments from suppliers, they were complete enough to place on chassis. Briggs will continue to supply all bodies and although eventually Packard will re-equip its pressed steel and body plants, this is still some distance off, probably not until 1947 models are started.

Total Packard employment is around 7000, compared with peak peacetime employment of 12,000 and peak wartime hiring of around 30,000. Questioned about the outlook for manpower, President George T. Christopher said he had plenty of "men" but he did not know about the "power." Production costs are up 17 per cent from the level prevailing late in 1941, base wage rate alone being up 12 per cent. Cost figures have been submitted to the OPA for the determination of retail price ceilings on 1946 models, but, as Christopher explained, these ceilings will not necessarily be the sales price on the cars.

On the question of the 30 per cent wage increase demand, it has been forwarded by the union local to the management, but the Packard president said if it had to be paid and no price relief granted, the company could make more money by closing its plants.

Sixty-eight mechanical and design changes are incorporated in the new Packard models which in general appearance follow closely the lines of the 1942 Clipper model. Among the new features is a redesigned steering gear of the worm and triple tooth type, the roller mounted on a double row of needle bearings extending the complete width of the roller, and the worm operating on two tapered roller bearings. Crankshaft bearing is the steel-backed type with a copper-nickel matrix impregnated with a special babbitt material. Pistons are fitted with an oil-control ring which is expanded by a coil spring. It is specifically aimed at giving uniform radial pressure on the cylinder wall and to eliminate clogging of oil slots, a difficulty which showed up widely in automotive engines during wartime driving.

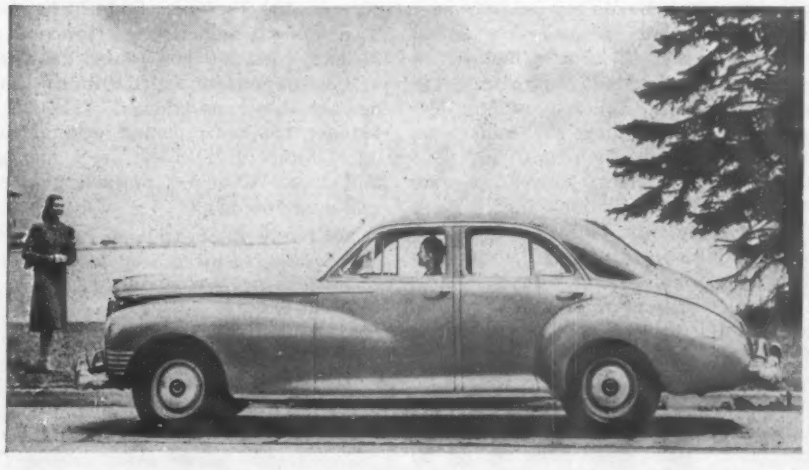
A clear picture of current operations in the various General Motors divisions was given on the occasion of a recent press conference held by C. E. Wilson, president, attended by top officials from the divisions. Buick is turning out 100 cars a day and this week will step the figure up to 200 daily. November schedules call for 10,000 or 500 per day, and continued acceleration will carry through to next March when it is planned to build 1800 daily. These figures, of course, are all based on the assumption no interruptions will occur either in GM plants or those of its many suppliers—not a realistic premise but at least the basis for figuring schedules.

Cadillac has started assemblies of the 62 model on a limited scale and plans to build 5000 this year, stepping up the rate to 320 per day by next March. It is hoped to complete 60,000 cars by next Oct. 1.

Oldsmobile began last week at a rate of 100 per day, with 2000-2500 scheduled for October, double this number in November, double again in December and up to the prewar rate of 1300 a day by March 1.

Pontiac is assembling about 150 daily, will double October production in November, triple it in December and reach the prewar peak in February, about 1800 daily.

Chevrolet schedules for passenger cars called for 9591 in October and as of Oct. 17 had completed 1100. November schedules call for 19,000, December 40,000. Truck schedules, of course, are higher, in September, around 50,000 having been built—13,000 military and 38,000 civilian. October truck schedules call for 23,000, November 41,000 and December 44,000, making a total of 128,960 or 238,960 for the year, barring interruptions. Two Chevrolet assembly plants, Kansas City and St. Louis, are now turning out passenger cars. The Norwood, O., plant is on the verge, and eight other plants will all be operating by January. Delays in passenger car schedules have been caused principally by lack of wiring harnesses from the strike-bound Packard Electric



NEW PACKARD: First postwar Packard Clippers will be shown early next month at regional dealer meetings in seven cities. The new model incorporates 68 design and mechanical changes. NEA photo

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DEALERS IN TRAINING: This class of 35 are General Motors dealers and service managers undergoing a training course at General Motors Institute. Miss Mildred Sandvig, first row center, is the first woman to enroll in the course. She is an active partner in Sandvig Motor Co., sales and service headquarters for GMC trucks in Prosser, Wash.

plant in Warren, O., which has now resumed operations.

Despite these optimistic forecasts, General Motors division heads say they actually cannot see more than three days to a week ahead from the standpoint of materials and parts supply, and last week sent letters to all salaried and hourly-rate employees in advance of the union strike vote, advising them to stay out of plants if a strike should be called. The tone of these letters to salaried employees was most doleful, one paragraph reading, ". . . . if it is possible for you to get into the plant, we want you to be there, but otherwise go home and make the most of the enforced holiday. Since the plant cannot be reopened without due notice, there is no need for you to stick too close to home in anticipation of a hurry call . . . in case you are unable to come to the plant, your salary checks will be mailed to your home on regular paydays."

At the end of the reconversion parade are the Chrysler divisions. Recently a few details of progress being made were revealed by K. T. Keller, president. The corporation is spending $57 million on its overall reconversion job, and $18 million more on plant changes. Among the equipment installations are 70 miles of conveyor systems, 8500 feet of drying ovens, 3100 feet of spray booths and 1256 new machine tools. In all, about 20,320 machines must be relocated and retooled. Of these, 18,090 were formerly on war production, 974 were purchased from government surpluses. Corporation employment is now 55,000, comparing with 75,000 prewar and 144,000 at wartime peak. Base wage rates are up 20 per cent from the 1941 figure.

Plymouth probably will be the first of the Chrysler divisions to have assemblies moving, and plans call for an assembly rate at the Detroit plant of 180 per hour. Branch assembly plants will further boost this rate of production.

Dodge Truck Division completed the last of its 400,000 military vehicles some weeks ago and is now going full tilt on civilian output, while cleaning up a small number of units on a lend-lease shipment to China. The postwar civilian truck line covers a wide range of models, body types, equipment and wheelbases on ½-ton, ¾-ton, 1-ton, 1½-ton, 2-ton and 3-ton chassis. Shortly to be announced is a new and revolutionary type of farm vehicle on a ¾-ton chassis. Among other features, it will be able to carry 75 loaded bushel baskets. Full details will be released around Dec. 1, but meanwhile the Dodge management gets a little ruffled if anyone refers to the new design as a "jeep."

Ford assemblies of passenger cars and trucks continue to top those of any other producer, the current rate being in excess of 400 cars and 500 trucks daily. Meanwhile production of Lincoln and Mercury models is just around the corner, and a reorganization of the Lincoln management has been effected. Thomas W. Skinner has been named general manager, Frank J. Denney, sales manager, and J. M. Waggoner continuing as general superintendent.

Ford steel plant engineers have worked out a system of using propane gas to supplement coke oven gas in blast furnaces, thus permitting some coke ovens to be shut down. This was necessary because of a serious drop in coal shipments by water during the recent coal strike. It is the usual policy to lay down a winter's supply of coal at the Rouge plant before the navigation season closes around Dec. 15. This has not been possible and will not be possible because of the lost time during the strike. Thus it has been necessary to trim coking operations and to plan for rail shipment of coal this winter. The same situation applies at Great Lakes Steel Corp. here, but as far as is known there has been no cutback in operations of its coke plant.

Extensive use of 17 per cent chromium stainless steel as trim on new passenger cars has created an extremely tight situation in deliveries of this material, most mills now quoting March and April, with order books jammed. Much of the stainless is used with a plain buffed finish but in cases where a perfect match is required with some other plated part a flash of chromium is applied to the stainless surface. By using a stainless base for plated parts, the need for an underplate of copper and nickel is avoided. Stainless suppliers are horrified, however, to think that anyone would be so foolish as to chrome plate a stainless steel.

A new gadget has been developed for the Ferguson tractor, produced by Ford, in the form of a "lift" which permits raising the rear wheels clear off the ground. It comprises two tubular arms sloping downward and forward with cradles at the top in which rests the rear axle. These act as pedestals which are connected at the base with sleeves around an anchoring crossbar, which is at the bottom of a four-sided tubular frame. The latter extends beyond the axle and slants upward to connect with the two lower lines of the tractor's three-link hitch. Hydraulic power is applied through the two lower links and swings the lift upward, using the ground as a pivot, so that the axle rides upward and forward, meshing into the cradles and carrying the front arms of the lift along. When the arms reach a vertical position under the axle the power is disengaged, thus leaving the lift and tractor anchored with the rear treads at any desired height up to 4 inches above the ground. A similar device can be adapted to the front wheels.

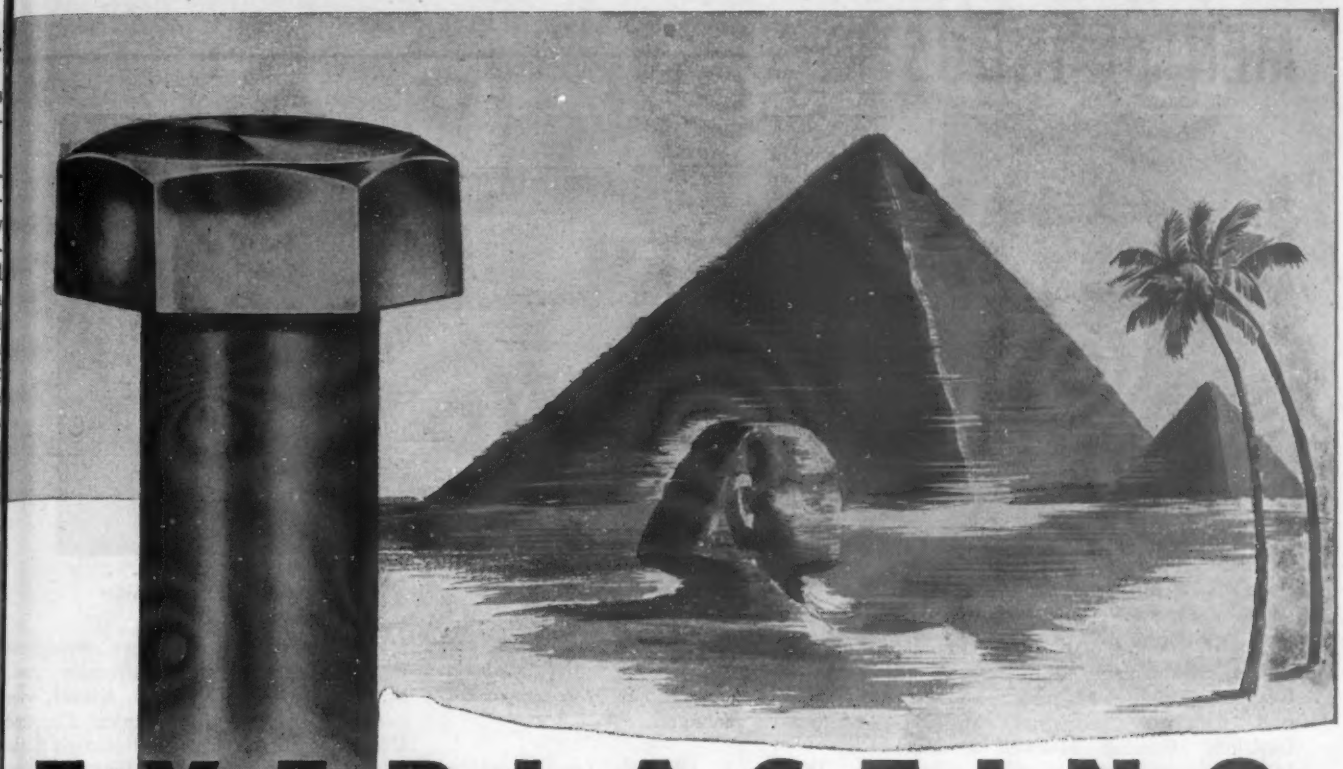
Fruehauf Trailer To Build Factory at Los Angeles

LOS ANGELES

Fruehauf Trailer Co. will build a $2,250,000 factory and a $650,000 sales and service branch on Los Angeles sites, it was announced last week by top officials of the Detroit company including Harvey Fruehauf, president; Roy Fruehauf, vice president; Kenneth Tice, vice president and director of sales, and H. H. Howard, vice president in charge of manufacturing.

The sales branch will be built on a 10-acre tract at Fifteenth and Alameda Sts. purchased at a reported figure of more than $250,000. It will employ from 150 to 200. The factory will be erected on a site to be chosen from several being viewed, the company officials disclosed in Los Angeles, and will need up to 1000 workers.

The new plants will be in addition to the company's existing plant in Vernon, Calif.



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MEN of INDUSTRY

HUGH KRAMPE

WILLIAM S. ALLEN

EDWARD C. HOEFLICH

Hugh Krampe has been appointed general sales manager, Rodgers Hydraulic Inc., Minneapolis. Mr. Krampe formerly was manager, Industrial Marketing Division, Manning, Maxwell & Moore Inc., Muskegon, Mich.

—o—

Edward F. Clark has been named assistant manager, sheet and strip steel division of the sales department, Weirton Steel Co., Weirton, W. Va. Mr. Clark formerly was chief of the Sheet and Strip Steel Branch, Steel Division, War Production Board, Washington.

—o—

Lynn Sawyer, general manager, Pump Division, Byron Jackson Co., Los Angeles, has been elected a vice president of the company.

—o—

W. E. Waste, formerly general manager, Marinship Corp., has been named president of Bechtel Bros., McCone Co., a newly organized construction and engineering firm with headquarters in San Francisco and Los Angeles. Executive vice presidents are: **J. P. Yates** and **Van W. Rosendahl**. **J. K. Doolan** and **V. G. Hindmarsh** are vice presidents. Directors include: **S. D. Bechtel, John A. McCone, K. K. Bechtel, John J. Simpson,** and Messrs. **Waste, Yates, Rosendahl, Doolan** and **Hindmarsh.**

—o—

N. E. Philpot has been appointed manager of sales, New York and New Jersey district, Michigan Steel Casting Co., Detroit. For a number of years Mr. Philpot has been New York manager for Duriron Co. Inc., Dayton, O.

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Clarence P. Sander, general superintendent Western Pipe & Steel Co. of California, at Los Angeles, has been elected vice president of the western district, American Welding Society.

—o—

Warren J. Kilburn, since 1931 sales manager, American Gear & Mfg. Co., Chicago, has been appointed general manager. **N. C. Schlegel**, who has been Chicago branch manager, Boston Gear Works Inc., for the past nine years, succeeds Mr. Kilburn as sales manager. **Charles S. Squyres** has been named foreign sales manager.

—o—

William S. Allen has been appointed sales manager, Winchester Repeating Arms Co., and Bond Electric Corp., divisions of Olin Industries Inc. He also has been appointed assistant sales manager, Ammunition Division, Western Cartridge Co., another division of Olin Industries Inc. Mr. Allen formerly was vice president, Marathon Foundry & Machine Co., Wausau, Wis.

—o—

Paul V. Osborn has been elected vice president in charge of manufacturing; **L. W. Fischer** and **N. R. Brownyer**, vice presidents, Timken-Detroit Axle Co., Detroit.

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W. J. Hazeltine, Mansfield, O., vice president in charge of distribution, has been named general sales manager, Buffalo-Springfield Roller Co., Springfield, O.

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B. J. Schumann has been appointed plant manager of the Indianapolis plant, Airtemp Division, Chrysler Corp. Mr. Schumann has served as chief estimator and supervisor of time study since September, 1942, joining the organization in August, 1936.

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O. E. Nesmith, Bloomington, Ill., has been named director of engineering, Eureka Vacuum Cleaner Co., Detroit. He has been serving as vice president in charge of manufacturing, Williams Oil-O-Matic Heating Corp., Bloomington, having been associated with that company for the past 25 years.

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American Welding Society, New York, at its recent annual meeting elected the following: **Harold O. Hill**, assistant chief engineer, fabricated steel construction, Bethlehem Steel Co., Bethlehem, Pa., first vice president; **George N. Sieger**, president and general manager, S-M-S Corp., Detroit, second vice president; **C. M. Underwood**, manager, weldment department, Northern Ordnance Inc., Minneapolis, and **Dr. A. B. Kinzel**, vice president, Electro Metallurgical Co. and Union Carbide & Carbon Research Laboratories Inc., **Charles H. Jennings**, section engineer, welding section, Westinghouse Research Laboratories, East Pittsburgh, Pa., and **R. D. Thomas**, president, Arcos Corp., Philadelphia, directors at large, for a term of three years. **Leon C. Bibber**, welding engineer, Carnegie-Illinois Steel Corp., Pittsburgh received the society's Lincoln gold medal for his paper, "Tensile Properties of Heavy Longitudinally Welded Plate Specimens Simulating Deck and Shell Joints." **H. H. Deppeler**, chief engineer, Metal & Thermit Corp., New York, **H. C. Boardman**, research engineer, Chicago Bridge & Iron Co., Chicago, and **Dr. David Jacobus** were presented with certificates of honorary membership.

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Edward C. Hoeflich has been appointed sales manager, Ace Mfg. Corp., Philadelphia. Mr. Hoeflich formerly managed the Steel Specialties Division, Henry Disston & Sons, Philadelphia.

—o—

Ralph A. Bard, former undersecretary of the Navy, has been elected a director, American Ship Building Co., Cleveland, succeeding **Comdr. Williams J. Conners Jr.**, chairman, Great Lakes Transit Corp.

—o—

Earl Stansel, formerly of Binghamton, N. Y., has been named works manager, Laporte Corp., Laporte, Ind., previously known as the Metal Door & Trim Corp.

—o—

W. H. Higginbotham has been named chairman, Edgar Allen & Co. Ltd., Sheffield, England. He is succeeded as secretary and chief accountant by **Herbert L. Wyneken**, who for the past seven years served in a similar capacity with Messrs. Beatson Clark Co. Ltd., Rotherham, England.

—o—

L. R. Austin, Billings, Mont., has been made distributor, Montana, Wyoming and Idaho, for wire rope, Wickwire

DAVID S. GENDELL JR.

Spencer Steel Co., New York. Stock inventories will be carried at Billings and Cut Bank, Mont., and Casper, Wyo.

—o—

David S. Gendell Jr. is retiring as general manager of erection, Bethlehem Steel Co., Bethlehem, Pa., after 45 years of continuous service with the same organization. He will be succeeded by **J. H. Wagner,** now manager of erection in the New York district. **G. C. Lane,** who has been with Bethlehem Steel since 1931, takes over Mr. Wagner's responsibilities in New York.

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Dr. Earl W. Flosdorf has been named director of research and development, F. J. Stokes Machine Co., Philadelphia.

—o—

H. F. Kneen has been named vice president in charge of manufacturing, and **G. G. Landis,** vice president in charge of engineering, Lincoln Electric Co., Cleveland. Mr. Kneen joined the Lincoln company in 1929, and has served as general plant superintendent since 1931. Mr. Landis is a veteran of more than 20 years' service with the company and he also is a director. He has complete charge of design and production engineering on welding equipment manufactured by the company.

—o—

Michael Schwarz, former director, Copper Division, War Production Board, and **Lt. Charles B. Homer,** have been added to the executive staff of Bridgeport Brass Co., Bridgeport, Conn. Mr. Schwarz will serve as market advisor and Mr. Homer returns as sales promotion manager.

—o—

James Berry, former General Motors sales executive, has been appointed vice president and treasurer of the Tanner Chemical Co., Ferndale, Mich. He will direct sales for the company, which produces a rustproof coating for metal surfaces.

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Harry Schwartz, Alaska Junk Co., Seattle, was elected president, Pacific Northwest chapter, Institute of Scrap Iron & Steel Inc., Washington. He succeeds **Jules Glant,** Pacific Iron & Metal Co. Inc., Seattle, and also becomes a director of the national institute. Officers elected are: First vice president, **Max Sidell,** Seattle Iron & Metals Corp., Seattle; second vice president, **Moe Michelson,** Riverside Junk Co. Inc., Everett, Wash.; secretary, **Earle Glant,** Pacific Iron & Metal Co. Inc., Seattle; and treasurer, **Harry Sidall,** Seattle Iron & Metals Corp., Seattle. Jules Glant was elected chairman of the executive committee.

—o—

John C. Patterson has been appointed executive vice president, National Patent Council, Gary, Ind., a new organization of smaller manufacturers which is launching a program in defense of the U. S. patent system. **James L. Straight** has been named Western Division executive director of the council.

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Lt. Col. Leroy E. Everett, following three and a half years with the Army Air Forces, has joined Lester B. Knight & Associates, Chicago, foundry engineers and consultants.

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Charles A. Reinbolt Jr. has joined American Central Mfg. Corp., Connersville, Ind., as sales promotion manager.

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George W. Racine, previously assistant secretary and assistant treasurer, was elected secretary and assistant treasurer, Keystone Steel & Wire Co., Peoria, Ill., at a recent meeting of the directors. **Alvin L. Ackerman** was made assistant secretary.

—o—

Mark H. Cummings has been appointed sales representative in the South Bend, Ind., territory for Janitrol heating equipment manufactured by Surface Combustion Corp., Toledo, O., also **Thomas H. Langan** who becomes assistant to the manager of the Cleveland district office.

—o—

Edward Roby, superintendent, Peoria Malleable Castings Co., Peoria, Ill., was elected president of the newly organized Central Illinois Chapter, American Foundrymen's Association. Other officers elected are: **Z. D. Madacey,** Caterpillar Tractor Co., Peoria, vice president, **C. W. Wade,** Caterpillar Tractor Co., secretary; **A. V. Martens,** Pekin Foundry & Mfg. Co., Pekin, Ill., treasurer. **Robert E. Kennedy,** of the national organization's office in Chicago, assisted in the organization and was present at the initial meeting.

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Westinghouse Electric Corp., Pittsburgh, has presented its highest honor, the Order of Merit, to two veterans of its East Pittsburgh works. **Raymond A. Frye,** manager, materials and standards section of the engineering laboratories and standards department, and **Carl W. E. Wallin,** test engineer, transportation and generator works department, are the recipients.

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Charles F. Stanley, vice president in charge of sales, Fafnir Bearing Co., New Britain, Conn., reaches the thirtieth anniversary of his joining the company, Nov. 6.

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James G. Black has been named manager, Washington office, Republic Steel Corp., Cleveland, succeeding **Forrest Rutherford,** who becomes executive assistant to the officers of the corporation.

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W. E. Bush, manager of European companies, prior to the war, Curtis Lighting Inc., Chicago, is in the United States after six years' absence, four of which were spent in German concentration camps. Mr. Bush has headquarters in the company's Chicago offices where he is gathering data necessary to settle the company's postwar policy in Europe.

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Meryl H. Geisking, sales vice president, Tennessee Coal, Iron & Railroad Co., Birmingham, has received a certificate for 30 years' service with the company.

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M. J. Siebert is resigning Nov. 1 as manager of steel casting sales, Otis Division, Cleveland, Jones & Laughlin Steel Corp., to engage in business for himself under the name of Mars Service & Supply Inc., 1319 Scofield Bldg., Cleveland. The new firm will act as manufacturers' sales representative and will also operate a steel warehouse. Mr. Siebert has been with the Otis Division and its predecessor company, Otis Steel Co. for the past 18 years.

—o—

Moses A. Temerson, Charles Temerson & Sons, Tuscaloosa, Ala., has been elected president of the Southeastern chapter, Institute of Scrap Iron & Steel Inc., Washington, and he succeeds **M.**

CHARLES T. EVANS JR.

Who has been appointed chief metallurgist, Elliott Co., Jeannette, Pa., as announced in STEEL, Oct. 22 issue, p. 96.

RICHARD F. SENTNER

Who is assistant general sales manager, Wheeling Steel Corp., Wheeling, W. Va., noted in STEEL, Oct. 8 issue, p. 96.

DR. WENDELL F. HESS

Who has been elected president of the American Welding Society, New York, noted in STEEL, Oct. 22 issue, p. 98.

FRANK C. TIPPERY

Recently appointed works manager, Morse Chain Co., Ithaca, N. Y., and announced in STEEL, Oct. 22 issue, p. 97.

W. Breman, Breman Iron & Metal Co., Atlanta. Other officers elected include: First vice president, **H. T. Herndon,** J. T. Knight & Son Inc., Atlanta; second vice president, **Louis B. Cline,** Cline & Berhnheim, Nashville, Tenn.; third vice president, **Irving Levin,** Superior Iron & Metal Co., Jacksonville, Fla. and secretary-treasurer, **John K. Travis,** Philip W. Frieder Co., Birmingham.

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Burnell O. Burritt has been appointed hydraulic design engineer, Craftsman Tool & Die Co., Detroit. Previously Mr. Burritt was associated with Federal Machine & Welder Co., Warren, O.

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F. G. Gerard has been elected vice president in charge of operations, Washington Steel Corp., Washington, Pa. Mr. Gerard formerly was plant superintendent, Eastern Stainless Steel Corp., Baltimore.

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Max Robbins has been appointed general manager, Federated Metals Divison, American Smelting & Refining Co. Mr. Robbins has been associated with that division since 1936.

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LeRoy Keane has been appointed director of sales, explosives department, Hercules Powder Co., Wilmington, Del.

—o—

W. P. Brown has resigned as president, Briggs Mfg. Co., Detroit, and **W. Dean Robinson,** formerly vice president and assistant general manager succeeds him. **E. E. Lundberg,** vice president in charge of engineering, assumes the duties of assistant manager.

OBITUARIES . . .

Michael J. Powers, 91, Chicago sales representative, J. S. McCormick Co., Pittsburgh, died Oct. 15 in Chicago. He had been associated with the company 45 years and was connected with the foundry industry over 65 years.

—o—

David McLain, 82, widely known foundry expert and head of McLain Systems, Milwaukee, died Oct. 18.

—o—

Dennis Kane, 58, superintendent of the sheet metal plant, General Motors Corp. Chevrolet Division at Flint, Mich., died recently.

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David W. McCord, vice president, McCord Corp., Detroit, died Oct. 18.

—o—

Fred H. Lammert, special representative of Youngstown Sheet & Tube Co., Youngstown, and connected with the Indianapolis district office for the past 10 years, died Oct. 21 in Cleveland.

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Edward A. McKamey, 86, a pioneer in the iron and steel business in New Albany, Ind., died recently.

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Oscar Wahlberg, 49, superintendent of the plant, Norton Co., Worcester, Mass., died Oct. 17. He had held similar positions with the company in France, England and Canada.

—o—

Howard W. Knapp, 72, former branch manager of the Closure Division office in New York, Armstrong Cork Co., Lancaster, Pa., died recently at his home in Brooklyn, N. Y. He retired in 1937.

—o—

Andrew J. Ireland, 63, for 39 years Chicago representative and district manager, Cleveland Twist Drill Co., Cleveland, died Oct. 17 in Chicago.

—o—

George S. Bartlett, 87, assistant to the chairman, Portland Cement Association, Chicago, and nationally known for his promotion of concrete highway construction, died Oct. 21, in that city. He had been identified with the cement industry since 1884.

—o—

David T. Howells, 91, former superintendent of rolling mills, Carnegie-Illinois Steel Corp. at Chicago, died recently. He retired in 1924.

—o—

Henry A. Goman, 69, founder and president, Natural Products Refining Co., Jersey City, N. J., died Oct. 16 at his summer home in Old Westbury, L. I., N. Y.

—o—

Ernest C. Norton, 68, inventor of the Norton piston ring, died recently.

—o—

Albert C. Ketler, 73, founder of the bridge construction firm, Ketler-Elliott Co., Chicago, died Oct. 14 in Chicago.

—o—

Sam Moskowitz, 34, a partner in Moskowitz Bros., Cincinnati, scrap brokers, died recently.

—o—

William I. Howland Jr., 58, sales manager in Milwaukee, Carnegie-Illinois Steel Corp., died Oct. 16 in Pittsburgh. He formerly was a vice president of the Illinois Steel Co.

—o—

Charles F. Fitts, 77, president, Rodger Ballast Car Co., Chicago, died Oct. 17 in that city.

—o—

Morris Cohen, 95, one of the original tinware manufacturers in this country, died recently in New York.

—o—

George M. Sullivan, retired manager of the sheet steel sales department, United States Steel Export Co., died Oct. 21 at his home in New York.

Steel Shipments Decline Reported

Data for August show tonnage down from the preceding month and like period of 1944. Total movement in first eight months of year considerably under 1944 figure

STEEL shipments of 4,512,637 net tons in August compared with 5,214,074 tons in July and with 5,837,328 tons in August, 1944, according to reports to the American Iron & Steel Institute, New York, from companies which in 1944 represented 99 per cent of total output of finished rolled steel products.

Total shipments for eight months in 1945 were 43,689,537 tons, compared with 46,559,642 tons in the comparable period of 1944.

Greatest decline was in plates, sheared and universal, shipments of which were 470,575 tons in August, 591,982 tons in July and 1,003,342 tons in August, 1944. Other steel products showed declines, at less rapid rate than in plates. Hot-rolled carbon bar shipments in August were 466,094 tons, compared with 564,193 tons in July and with 589,049 tons in August, 1944. Total bar shipments were 652,894 tons, 791,240 tons and 832,471 tons, respectively.

Hot-rolled sheet shipments were on a declining scale, 519,829 tons in August, 558,126 tons in July and 574,176 tons in August, 1944. Galvanized sheet shipments made a gain over last year, 135,633 tons being moved in August, compared with 125,423 tons in the like month last year. Drawn wire fell off from 192,041 tons in August, 1944, to 149,536 tons in the like month this year.

August Manganese Output, Consumption Show Loss

Consumption of manganese alloys declined 21 per cent in August, according to the Bureau of Mines, mainly because of an 18 per cent loss in steel production. Ferromanganese consumption was 44,876 net tons, a loss of 21 per cent from July and lowest since April, 1941. Use of spiegeleisen also was lowest in more than four years and silicomanganese consumption dropped to about the level of April, 1943.

Consumption of manganese ore in August was 127,157 net tons, slightly higher than the 126,720 tons used in July. Of August consumption 94 per cent was in manufacture of manganese alloys, 2 per cent greater than in July. Manganese ore used for batteries, chemicals, pig iron and steel all declined in August. Industrial stocks of manganese ore at the end of August were 491,172 tons, compared with 512,580 tons July 31.

Domestic production of manganese ore during August was 14,000 net tons, shipments were 14,100 tons and producers' stocks at the month-end were 400 tons. This compares with July production of 17,700 tons, shipments 17,800 tons and stocks 500 tons. August imports of manganese ore with 35 per cent or more manganese were 146,543 tons compared with 167,123 tons in July.

Ferromanganese production in August totaled 54,703 net tons, an increase of 5 per cent over July. Shipments from furnaces totaled 52,890 tons, compared with 53,930 tons in July.

AMERICAN IRON AND STEEL INSTITUTE
CAPACITY, PRODUCTION AND SHIPMENTS

Period AUGUST - 1945

Steel Products	Number of companies	Items	Maximum Annual Potential Capacity Net Tons	Current Month: Production Net Tons	Current Month: Production Per cent of capacity	Current Month: Shipments (Net Tons) Total	Current Month: Shipments (Net Tons) To members of the industry for conversion into further finished products	To Date This Year: Production Net Tons	To Date This Year: Production Per cent of capacity	To Date This Year: Shipments (Net Tons) Total	To Date This Year: Shipments (Net Tons) To members of the industry for conversion into further finished products
Ingots, blooms, billets, tube rounds, sheet and tin bars, etc.	51	1	xxxx	xxxx	xxx	405,001	149,582	xxxx	xxx	5,575,112	1,515,646
Structural shapes (heavy)	11	2	9,580,550	300,377	38.7	286,333	xxxx	2,295,404	38.4	2,298,593	xxxx
Steel piling	4	3		14,780		13,187	xxxx	154,354		157,262	xxxx
Plates (sheared and universal)	27	4	17,841,320	484,683	32.0	470,575	33,087	5,511,140	46.4	5,390,567	407,396
Skelp	6	5	xxxx	xxxx	xxx	64,146	28,506	xxxx	xxx	515,470	272,295
Rails—Standard (over 60 lbs.)	4	6	3,669,000	191,840	61.5	176,093	xxxx	1,478,229	60.5	1,447,475	xxxx
—All other	5	7	512,000	12,007	27.6	10,013	xxxx	111,879	32.8	114,709	xxxx
Splice bars and tie plates	12	8	1,745,960	57,704	38.9	60,030	xxxx	505,281	43.5	522,311	xxxx
Track spikes	10	9	349,400	12,366	41.7	13,025	xxxx	102,251	43.9	106,299	xxxx
Hot Rolled Bars—Carbon	38	10	xxxx	575,382	xxx	466,094	67,700	5,766,173	xxx	4,538,110	713,677
—Reinforcing—New billet	13	11	xxxx	65,799	xxx	69,117	xxxx	433,108	xxx	440,398	xxxx
—Rerolled	14	12	xxxx	3,986	xxx	5,950	xxxx	48,306	xxx	55,293	xxxx
—Alloy	24	13	xxxx	153,841	xxx	111,733	12,086	1,968,437	xxx	1,425,498	172,249
—Total	46	14	22,381,700	799,008	42.0	652,894	79,786	8,216,024	55.1	6,459,299	885,926
Cold Finished Bars—Carbon	23	15	xxxx	118,544	xxx	115,154	xxxx	1,188,439	xxx	1,184,341	xxxx
—Alloy	25	16	xxxx	25,730	xxx	21,537	xxxx	283,489	xxx	256,119	xxxx
—Total	32	17	3,015,910	144,274	56.3	136,691	xxxx	1,471,928	73.3	1,440,460	xxxx
Tool steel bars	17	18	273,010	9,751	42.0	8,436	xxxx	90,301	49.7	89,420	xxxx
Pipe and Tubes—Butt weld	16	19	2,232,520	127,744	67.3	128,703	xxxx	1,031,847	69.4	1,010,625	xxxx
—Lap weld	9	20	830,200	38,642	54.8	39,090	xxxx	357,357	64.6	369,301	xxxx
—Electric weld	11	21	1,570,900	78,518	58.8	72,177	xxxx	693,451	66.3	617,201	xxxx
—Seamless	16	22	3,377,700	190,270	66.3	142,769	xxxx	2,018,417	89.7	1,597,693	xxxx
—Conduit (cap. & prod. incl. above)	7	23	xxxx	xxxx	xxx	8,088	xxxx	xxxx	xxx	56,949	xxxx
—Mech. tubing (cap. & prod. incl. above)	11	24	xxxx	xxxx	xxx	44,780	xxxx	xxxx	xxx	501,917	xxxx
Wire rods	27	25	7,266,670	345,709	56.0	107,710	35,372	3,024,284	62.5	879,927	304,868
Wire—Drawn	41	26	5,664,690	258,574	53.7	149,536	9,628	2,367,019	62.8	1,414,181	79,991
—Nails and staples	19	27	1,253,360	48,441	45.5	47,858	xxxx	397,001	47.6	401,826	xxxx
—Barbed and twisted	15	28	539,610	18,188	39.7	18,213	xxxx	157,084	43.7	157,346	xxxx
—Woven wire fence	16	29	1,113,860	28,402	30.0	28,786	xxxx	240,839	32.5	239,686	xxxx
—Bale ties	12	30	149,700	6,090	47.9	7,138	xxxx	49,347	49.5	55,224	xxxx
Black Plate—Ordinary	9	31	xxxx	xxxx	xxx	41,757	383	xxxx	xxx	337,728	3,319
—Chemically treated	8	32	465,000	7,882	20.0	7,483	xxxx	75,771	24.5	69,536	xxxx
Tin and Terne Plate—Hot dipped	10	33	3,793,850	168,200	52.2	176,882	xxxx	1,384,978	54.8	1,478,352	xxxx
—Electrolytic	10	34	2,231,850	72,849	38.4	68,411	xxxx	587,660	39.5	601,818	xxxx
Sheets—Hot rolled	30	35	19,197,320	1,072,952	65.8	519,829	30,974	9,010,338	70.5	4,562,434	311,624
—Cold rolled	12	36	7,131,460	368,388	60.8	216,982	xxxx	3,004,751	63.3	1,740,822	xxxx
—Galvanized	16	37	2,915,130	134,523	54.3	135,633	xxxx	1,161,454	59.8	1,166,207	xxxx
Strip—Hot rolled	24	38	7,055,390	190,669	31.8	122,078	21,741	1,792,506	38.2	1,112,034	184,923
—Cold rolled	35	39	3,119,850	99,985	37.7	94,490	xxxx	929,435	44.7	874,465	xxxx
Wheels (car, rolled steel)	5	40	319,400	21,609	79.6	23,255	xxxx	196,465	92.4	196,742	xxxx
Axles	6	41	408,170	11,196	32.3	11,327	xxxx	98,474	36.2	101,082	xxxx
All other	5	42	190,490	3,644	22.5	3,238	xxxx	32,079	25.3	29,464	xxxx
TOTAL STEEL PRODUCTS	152	43	xxxx	xxxx	xxx	4,512,637	389,059	xxxx	xxx	43,689,537	3,965,988
Effective steel finishing capacity	152	44	67,310,000	xxxx	xxx	xxxx	xxxx	xxxx	xxx	xxxx	xxxx
Percent of shipments to effective finishing capacity	152	45	xxxx	xxxx	xxx	72.1%	xxxx	xxxx	xxx	88.6%	xxxx

WING TIPS

Development of propjet, which through two-way harnessing of gas turbine force drives a propeller and boosts with jet thrust simultaneously, opens broad new field for airplane propulsion. Promises greater speed range than pure jet propulsion

DEVELOPMENT of a new type aircraft power plant, which through two-way harnessing of gas turbine force drives a propeller and boosts with jet thrust simultaneously, has been announced by General Electric Co., Schenectady, N. Y.

Marking an advanced milepost in the development of aircraft power units, this G-E propjet, developed under wartime pressure, opens a broad and new field for civilian airplane propulsion development.

Designed primarily to drive large high-speed military transports and bombers, this propjet has been subjected to rigid test stand runs, and in June of this year was installed in an experimental Army Air Forces plane of advanced design.

The gas turbine with propeller is designed for installation in the wings of multi-engined aircraft or in the nose of a single-engine plane. The air rams into the nose of the propjet through ducts opening forward. This air is compressed by axial flow units in the forward part of the engine and then forced into combustion chambers. There fuel is injected and burns intensely. This raises the temperature and velocity of the gases, which then, with great energy, strike the buckets of the turbine wheel. The turbine, spinning more than 10,000 times a minute at a temperature over 1500 degrees Fahr., absorbs the major part of the energy in the gases.

The turbine powers the compressor and through reduction gears drives the propeller. Reactive thrust created by the energy remaining in the gases passing through the turbine wheel and discharging rearward is utilized in jet propulsion so that the propjet combines both propellor and jet power.

The power generated by these new units already is great and engineers see no basic difficulties in increasing the propulsive output of this type of gas turbine to almost any force visualized as necessary to drive the projected mammoth planes of the future. Here it opens a vast and unexplored field in aircraft propulsion, because aircraft engineers agree generally that the size and power developed by conventional reciprocating engines is reaching the peak which can be attained without prohibitive complexity.

Some of the major advances in air power established by this new gas turbine include:

LIGHTER ENGINES: The propjet type of power plant will make it possible for planes to be powered by smaller, lighter weight engines, while carrying increased loads at greater range.

SIMPLICITY: The propjet gas turbine is a simple and compact power plant in which the power is developed in a single high speed rotor, spinning many thousands of times a minute.

ENGINE VIBRATION ZERO: This new gas turbine power plant produces virtually no vibration, even when operating at maximum power. Conventional reciprocating engines produce high vibration when operating at maximum power.

HIGH POWER CONTINUOUSLY: The propjet gas turbine functions most efficiently and economically when producing full power continuously during long flights. Conventional reciprocating engines function economically and smoothly only when cruising at reduced speeds at far below their maximum power.

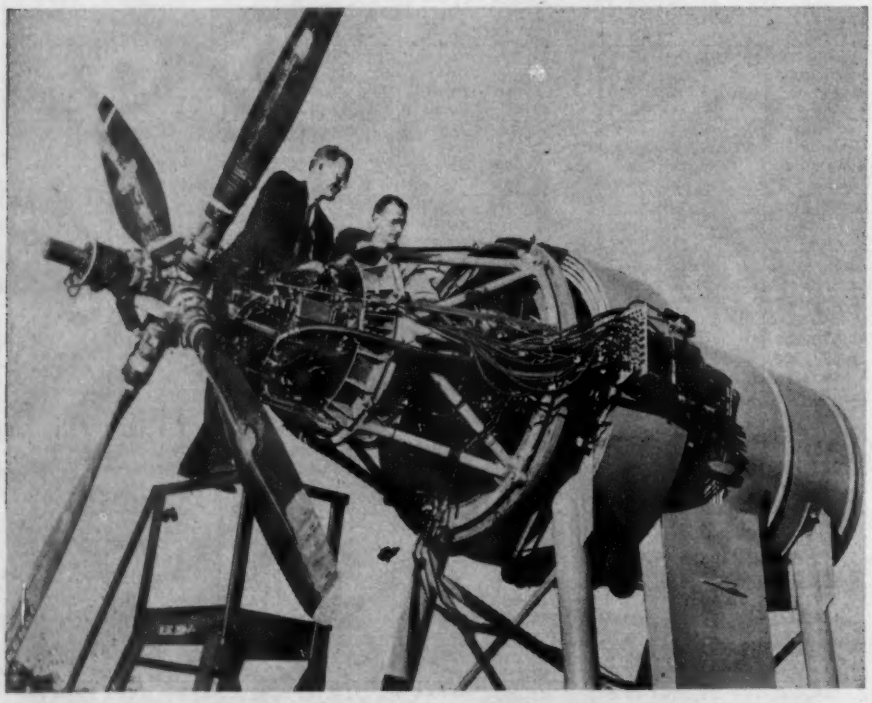
SPEED REDUCING GEARS: The swiftly revolving turbine drives a propeller through speed reducing gears. Development of this reduction gear has been an outstanding engineering accomplishment.

FUEL: The gas turbine can be developed to function efficiently on virtually any liquid fuel. Kerosene has been used for the actual tests thus far.

RANGE: The range of planes powered by gas turbines of this new type will be extensive. Economical flights from New York to San Francisco, or from Washington to London, will be possible with planes powered by such turbines. When flying at slow speeds, at low altitudes, the gas turbine uses more fuel than a reciprocating engine would use cruising under similar conditions, but when operating at full power the turbine uses less fuel than a conventional engine operating at maximum power. The turbine functions most efficiently at high altitudes where the air is colder than at lower altitudes.

GREAT SPEED: The speed limits on planes powered by the new turbine are unquestionably the compressibility barriers that are reached by all propeller driven planes somewhere slightly above 500 miles an hour. Planes powered by the propjet units can operate over long ranges at speeds close to this compressibility wall while planes driven by reciprocating engines cruise on long flights at reduced speeds.

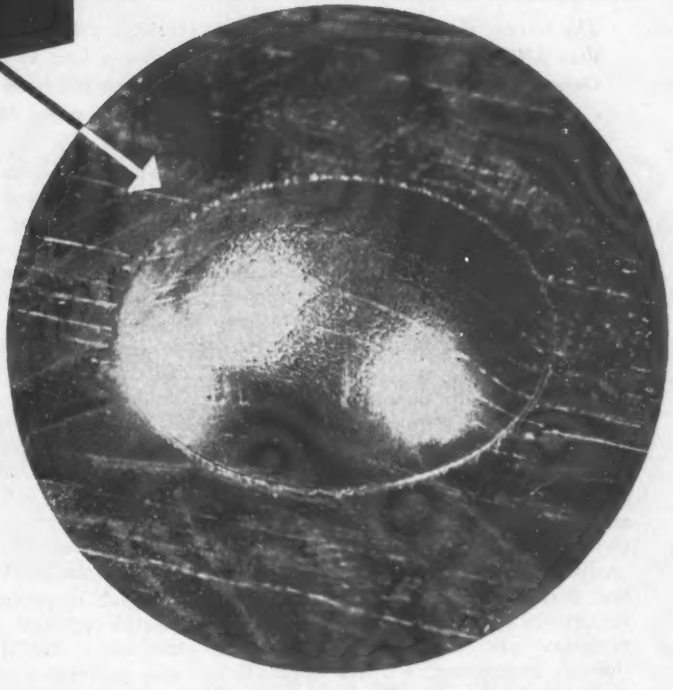
COMPARED TO PURE JET: Planes powered by these new gas turbines may not reach the extreme high speeds attained by the newest AAF fighter, the jet-propelled Lockheed P-80 which, powered by the super G. E. jet, flies faster than any other plane in the air today. On propeller driven aircraft, the propeller blades spinning at high speed are the first part of the plane to be affected by the compressibility barrier. The P-80, being jet propelled and having no propeller, has eliminated



General Electric propjet is shown on a test stand at Schenectady. This light engine of simple design functions efficiently and economically when producing full power continuously for long periods. It opens a new field in propulsion developments and engineers believe it will be used extensively to power large transports

If You Draw Zinc-Coated Sheets You Can Get....

The zinc coating cracked and flaked when this ordinary galvanized steel sheet was put to the ball impact test. Note the loose scales of zinc at the point of impact, which means complete loss of the protective zinc coating.



The zinc coating on a sheet of ARMCO ZINCGRIP is smooth and intact after the same test. Here the special zinc coating s-t-r-e-t-c-h-e-s with the steel—gives your products unbroken zinc protection.

Does *"deep-drawing* zinc-coated steel" bring to mind the kind of workable zinc-coated sheets you've always wanted?

Then ARMCO ZINCGRIP is the practical answer for your drawn and formed products. The specially-applied zinc coating will take *as severe a draw as the base metal.*

Armco Research created ZINCGRIP for tough fabricating jobs, such as deep draws and double-lock seaming. The coating stretches and "flows" with the steel in the press, assures unbroken zinc protection for every part. There is no flaking or peeling.

When your fabricated products are to be painted, you can obtain ZINCGRIP with the mill-Bonderized ARMCO PAINTGRIP finish. It takes paint without pre-treatment and prolongs its life.

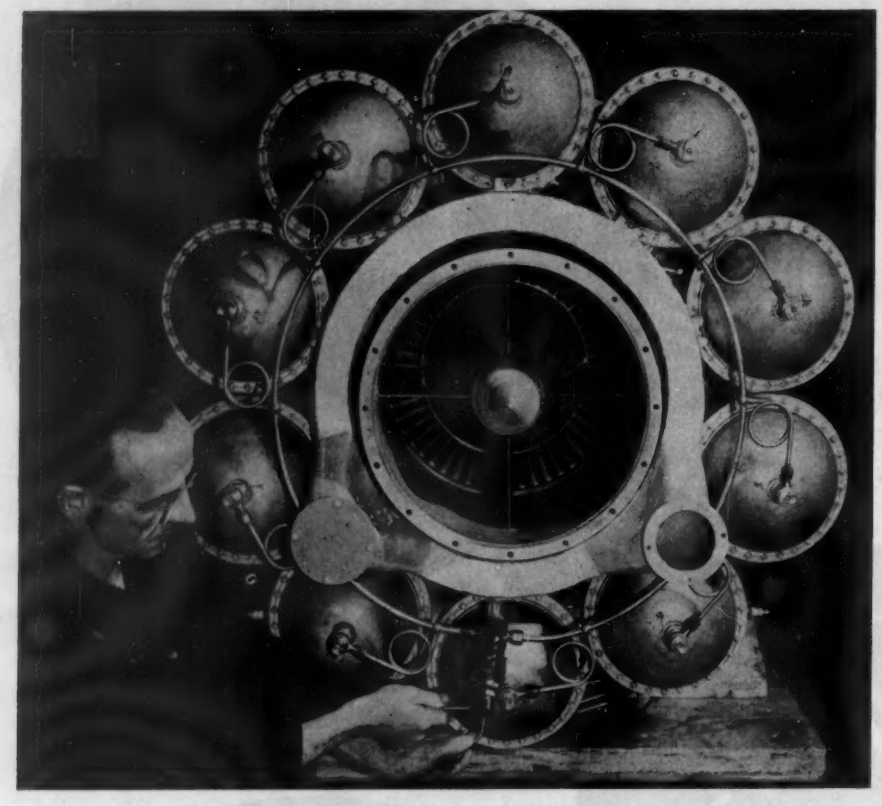
If you'd like to give your products the extra manufacturing and selling advantages of ARMCO ZINCGRIP, let us tell you more about this special-purpose sheet steel. Write for the illustrated ZINCGRIP booklet. The American Rolling Mill Company, 2861 Curtis Street, Middletown, Ohio.

Export: The Armco International Corporation

Special-Purpose Sheet Steels

The American Rolling Mill Company

ZINCGRIP ★ ARMCO ★ STEEL



The turbine that revolves more than 10,000 *times a minute in heat more intense than* 1500 *degrees Fahr. while in flight is shown here in the center rear of a General Electric J-*33 *jet engine. Jet exhaust cone has been removed to expose the main section of the one moving part in the jet engine*

that problem and permitted top plane speeds closer to the compressibility wall now limiting speeds of our fastest planes. However, engineers are of the opinion that while the new propjet type of gas turbine may not power our fastest planes, it will give ranges greater than may be possible with pure jet propulsion.

Although the development of this powerful propjet now is an accomplished fact, engineers realize that there still is much new territory to explore in this new field of harnessing gas turbine power for aircraft propulsion. Study by outstanding aeronautical engineers, both military and civilian, already is advanced along this line, and practical developments of major importance to swift and economical transportation are considered a certainty through improvements in the application of gas turbine power to the driving of propellers and generating jet thrust for large transports and bombers where speed, range and load all are of importance.

Secrecy Partially Lifted On Jet Aircraft Engines

Much of the secrecy surrounding the much publicized jet engines used in Allied aircraft late in the war was lifted at a recent Wright Field air show. Development work on these engines was accelerated early in 1943 when the German jet-powered ME-262s appeared in the air over Europe and outflew conventional gas-engine Allied fighters. The ME-262 had two wing-mounted jets and developed a top speed of 600 miles per hour.

The small American jet engine developed by the General Electric Co. was designated the J-31 and was used in the Bell P-59 fighter. This engine is rated at 1600 pounds per square inch thrust at 16,500 revolutions per minute. The P-80 fighter is powered by a larger jet, the J-33, which develops 3800 psi thrust at 11,500 rpm. A still larger jet, the J-35, has a 4200 psi thrust at 7800 rpm and is reported being considered for new heavy bombers, the XB-43, 45, 47 and 49.

Latest development, XT-31, a combination jet and propeller job, is being tried out in the XP-89. It is impossible to give horsepower ratings to jet engines but it is figured that at 375 mph, one pound of thrust is equal to one horsepower.

Because of the extremely high temperatures involved, materials in jet engines have been a constant headache but considerable progress is being made. In fact the life of the engine is reported to have been lifted from an average of about 25 hours to 50 hours. German jets also had a life span of 25 hours. In the GE jets, Inconel is being used for the combustion chambers. This alloy analyzes about 75.0 nickel, 14.0 per cent chromium, 0.6 aluminum, 3.0 per cent titanium and 6.0 iron. Timken alloy (chromium 16.0, nickel 25.0, molybdenum 6.0, iron 50.0, carbon 0.08) is used for turbine impellers and Vitallium for turbine buckets (cobalt 64.0, chromium 27.0, molybdenum 5.0, iron 2.0). Shafts are SAE-4140.

Two heavy-duty gasoline engines developed late in the war were the Pratt & Whitney R-4360C and the German BMW-803. The former weighs 3470 pounds and developed 3500 horsepower and is designed for use in the B-36 and cargo planes. It has single-stage, single-speed supercharging with water injection. The German engine was just getting into production at the Bavarian Motor Works as the war closed. It is a 28 cylinder radial, employing counter-rotating propellers and 2-stage, 2-speed supercharging. Rating is 3960 hp at 2950 rpm.

Firm Produces New Models Of Light Plane Engines

Continental Motors Corp., Muskegon, Mich., is starting deliveries of three new 6-cylinder aircraft engine models for light planes and by the end of this year will have four additional 6-cylinder models in production.

Introduction of these seven new engine models is a part of the company's plan to strengthen its position as one of the leading manufacturers of engines for light planes. When all are in production Continental will blanket the light plane field with engines ranging from 65 to 210 horsepower. The company's overall program is geared to customer orders calling for 1946 deliveries greater than in any previous year.

All of the 6-cylinder engines are air-cooled, horizontally-opposed jobs similar to the company's 4-cylinder models which are rated at 65, 75, and 85 horsepower. The three 6-cylinder models on which shipments have just started are rated at 100, 115, and 125 horsepower. The additional models to go into production will be rated at 150, 165, 185, and 210 horsepower.

In addition to its light plane engines, Continental will produce both 7 and 9-cylinder radial engines for larger planes.

The 9-cylinder engine, rated at 525 horsepower is to be used in a medium weight plane.

The 7-cylinder engine is basically the same as the company's R-670 made before the war, which was adopted by the Army and Navy as standard for primary training planes. It is rated at 220 to 240 horsepower.

Bendix Aviation's Total Employment off Sharply

Bendix Aviation Corp.'s total current employment is approximately 30 per cent of the company's wartime peak, and the unfilled order backlog of $60 million is roughly only one tenth as large as that of last year with a substantial portion of government contracts which may yet be canceled.

Improved HYDRAULIC CYLINDERS

In addition to hydraulic cylinders, Weatherhead plants make all types of fittings, valves, hose lines and other parts for these industries:

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★

REFRIGERATION

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RAILROAD

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MARINE

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FARM EQUIPMENT

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DIESEL

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Borg-Warner Plans Program Of Expansion

$20 million to be spent during next two years in preparation for additional business. Employment to be increased

BORG-WARNER Corp., Chicago, plans to spend between $20 million and $25 million in the next two years for reconversion, plant improvements and expansion, C. S. Davis, president, announced last week. The expenditures will involve new building construction, plant additions, purchase of new equipment, and replacement of worn or outmoded machinery.

By the end of 1945, the corporation expects to be producing at a pace to meet all consumer demands in the automotive, aviation, and agricultural fields, and will be geared to increase its output in household appliances and other lines.

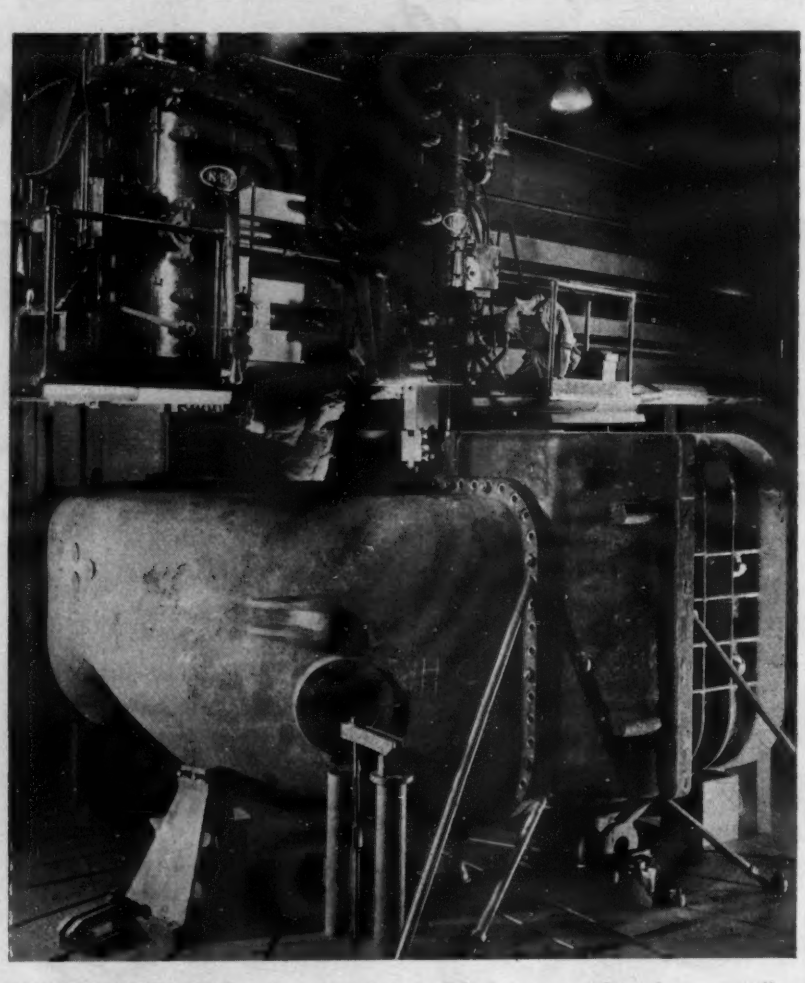
In announcing the production program, Mr. Davis said he expects an increase in sales of Borg-Warner's major products of from 35 to 50 per cent above prewar levels. To meet this increased business, he said, the corporation is planning to increase employment by not less than 25 per cent above former peacetime figures. This would bring total employment in the 23 Borg-Warner divisions and subsidiaries to approximately 14,000 employees engaged in making products for automotive, agricultural, aviation, household, marine, and industrial fields.

Basis for Confidence

Mr. Davis explained that Borg-Warner is basing its confidence in future business in part on the fact that its recently-announced development of a new automatic transmission for motor vehicles eventually would make for a large increase in transmission and clutch production, fields in which the corporation has maintained a major position for many years.

For the additional automatic transmission production alone, expansion plans call for an expenditure of approximately $12 million. Production of the transmission will involve the Detroit Gear, Warner Gear, Borg & Beck, and Long Divisions.

During the war, many new products were developed for the aviation branch of the military forces, including fuel, vacuum and hydraulic pumps for the various types of planes. Manufacture of these items not only will be continued for the aviation industry by the Pesco Products Division at Cleveland, but for the automotive and agricultural implement industries as well.



POWERMAKER: This exhaust end assembly being machined on an Allis-Chalmers 40-foot boring mill is a major part of a large, new, single-cylinder steam turbine designed for a Midwest utility

BRIEFS . . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

Mississippi Valley Structural Steel Co., Decatur, Ill., announced that R. D. Wood, president, and H. H. Cosley, secretary, have transferred their offices from the company's plant at Melrose Park, Ill., to the Conway Bldg., 111 West Washington St., Chicago.

—o—

Edison General Electric (Hotpoint) Appliance Co., Chicago, announced that all of its appliances will be delivered at a price uniform throughout the nation, instead of under an f.o.b. factory policy.

—o—

Pacific States Steel Corp. announced that the new address of its San Francisco sales office is 375 Ashby Ave., Berkeley 2, Calif.

—o—

Refrigeration Equipment Manufacturers Association, Chicago, envisions complete "cold centers" serving entire communities or towns and offering services ranging from storage of furs and blankets to processing and storage of frozen foods.

—o—

Allison Division, General Motors Corp. has purchased from the Defense Plant Corp. an aluminum foundry at Bedford, Ind., and will produce aluminum castings for general industrial purposes. Allison also has assumed management of the General Motors-owned Antioch Foundry at Yellow Springs, O.

—o—

International Derrick & Equipment Co., an Ohio corporation and parent company of International Derrick & Equipment Co. of California, is taking over all assets and assuming all liabilities

of the California company, which is being dissolved.

—o—

Packard Motor Car Co., Detroit, announced completion of its newest motion picture, "Men Bet Their Lives on It." The film, produced by Princeton Film Center, Princeton, N. J., depicts Packard's war role as producer of precision built engines for aircraft and marine use.

—o—

Walfred Equipment Co., Buffalo, a newly-formed firm, has acquired a one-story building and land at 179-183 Grider St. for manufacture of brewery equipment. Charles F. Hohensee is president.

—o—

Fedders Mfg. Co. Inc., Buffalo, has leased the Maspeth, L. I., plant of Frank J. Quigan Inc. for manufacture of automobile heater parts and for operation of a plastic division. Stockholders of Fedders company have approved a five-for-one split-up of outstanding common stock.

—o—

Machinery & Allied Products Institute, Washington, announced publication of its new pamphlet, "Capital Goods Industries and Postwar Taxation."

—o—

Standard Transformer Co., Warren, O., is represented in New York state north and west of Albany by Hunter & Bell, 259 Delaware Ave., Buffalo 2, and 625 Cumberland Ave., Syracuse 10.

—o—

Hewitt Rubber Corp., Buffalo, has purchased a large plant adjacent to its headquarters on Kensington Ave. to provide additional space for manufacture of new peacetime products and for expansion of its present lines of industrial rubber items.

—o—

Lodge & Shipley Machine Tool Co., Cincinnati, has received an Office of Price Administration citation for share-the-ride achievement, above national and regional averages, during wartime.

—o—

Permanente Cement Co., Oakland, Calif., is constructing a brick plant at Moss Landing, Calif., and will move brick presses and equipment from Milpitas, Calif., to Moss Landing early next year.

—o—

John L. Steward & Co., sales organization, Washington 4, has opened new and enlarged offices in Suite 300, 609 F St. N. W.

—o—

Badger Ball & Roller Bearing Co., 1125 North Van Buren St., Milwaukee, has purchased the Ahlberg Bearing Co., that city.

—o—

Safety Grinding Wheel & Machine Co., Springfield, O., has appointed Hyde Abrasive Products Co., 83 Fairfield Ave., Bridgeport 3, Conn., as representative in the New England states.

Liquid Honing Being Studied In Battelle Laboratories

Investigation of the full potentialities of liquid honing as a metal product manufacturing tool has begun in the production research laboratories of Battelle Memorial Institute, Columbus, O.

In a research program sponsored by Vapor Blast Mfg. Co., Milwaukee, engineers at Battelle will explore the uses and limitations of this metal finishing technique which was invented about two years ago by Arthur H. Eppler, president, Vapor Blast company. The method found rapid application in war manufacturing. Approximately 300 vapor blasting machines will be manufactured in 1945. The Battelle engineers will attempt refinements and development of improved control methods in the use of the process.

Liquid honing, or vapor blasting, is based upon the use of a very fine abrasive in a chemical emulsion. The emulsion is discharged by compressed air against the surfaces to be finished, and abrasive action of the emulsion gives finely polished finishes to the parts being blasted.

Firm Offers New Special Grade of Ferromanganese

A new special low-carbon ferromanganese, available at the same price as the regular grade, has been announced by Electro Metallurgical Sales Corp., a unit of Union Carbide & Carbon Corp., New York.

This special grade is produced in the maximum 0.10 per cent carbon grade. Following is a typical analysis: Manganese, 90 per cent minimum; phosphorus, 0.06 per cent; and carbon, 0.06 per cent. The high ratio of manganese to undesirable elements in the special low-carbon ferromanganese makes it particularly useful for adding manganese to stainless steel and other quality steels where high purity is essential, the Electro Metallurgical Sales Corp. pointed out.

Baltimore Steel Warehouse Bought by J. A. Doyle Jr.

Wm. G. Wetherall Inc., which will celebrate its 100th anniversary next year as Baltimore's oldest steel warehouse, has been acquired by Joseph A. Doyle Jr., who has become president.

Mr. Doyle was formerly affiliated with the Baltimore sales office of the Jones & Laughlin Steel Corp., as district sales representative in Maryland and the District of Columbia. Prior to becoming associated with that office in 1938 he worked in the general sales office of Jones & Laughlin in Pittsburgh, starting in June, 1936.

Asks Contract Terminations Be Speeded Up

Chicago Ordnance District chief says delays in submitting claims are blocking reconversion

DECLARING that termination settlements are blocking the road to reconversion, Col. John Slezak, chief, Chicago Ordnance District, is urging war contractors to re-intensify their efforts to submit inventories and claims on V-J Day contract cancellations.

The nation cannot get on with the business of peace until these remnants of war are cleared away, he states, pointing out the Chicago district's objective is to complete its job and get out of industry's way as quickly as possible.

Colonel Slezak states that as of Oct. 15 the district had 975 cases, involving approximately $1 billion in canceled production remaining to be settled. Of these cases, 51 are over four months old, with an additional 37 pending between three and four months.

"On our 975 remaining cases, we have received only 602 inventories and 487 claims from contractors," he says. "Settlement negotiations cannot even be started until inventories and claims are submitted.

Making Satisfactory Progress

The district has set a goal of settling at least 97 per cent of its cases by Dec. 31 and is making satisfactory progress toward it. In September, the district settled 295 cases, topping July, the previous high month for settlements, by 111 cases.

Following end of the war against Japan, the district received almost 100 per cent cancellations on its active production contracts, according to Colonel Slezak. Production, which reached a peak of $164 million in March, dropped to $55 million in August and $10 million in September.

At present, the district has only 15 active contracts, involving $7 million of production. Largest of the contracts are with International Harvester Co. for several hundred Army hospital busses, and Massey-Harris Co. Inc. for thirty 155-millimeter howitzer motor carriages to be produced this month. Colonel Slezak says that the district is continuing research and development work at a number of companies, but that these contracts are not large in dollar volume.

Number of district employees, including both civilian and military personnel, has dropped from 4505 on V-J Day to 3243 on Oct. 15.

Conditions affecting the Quality of Steel for...

COLD-HEADING

Many quality factors are found difficult to reduce to mathematical exactness due to inability to control variables other than the one being studied. However, correlation is shown between macrostructure and die life

A PROGRESSIVE step toward more economical manufacturing methods has been the development of the cold heading or cold forging process. Practically all fastening devices for the automotive industry such as bolts, rivets, screws, etc., are cold formed.

To a large degree, the economics of the process are dependent on the life of the forming dies. These dies are chiefly confined to carbon steel analyses with a carbon content of from 0.80-1.15 per cent, a manganese content of 0.20-0.50 per cent, and a silicon content of from 0.15-0.40 per cent. There are occasions when a small amount of other alloying elements are present—chromium, vanadium and molybdenum being the most common. These elements are present in proportions not exceeding 1 per cent.

In order to ensure adequate die life the quality of this steel should be under close control. Quality is considered here as a factor not connected with chemical composition with the exception of the sulphur and phosphorus contents or with other characteristics such as hardenability and grain size.

There are three tests commonly used to determine quality: (1) The deep etch test, (2) microscopic examination for non-

Fig. 1—Domestic electric chromium-vanadium steel macrostructure

Fig. 2—Swedish acid open-hearth carbon steel macrostructure

Fig. 3—Swedish acid open-hearth carbon steel macrostructure

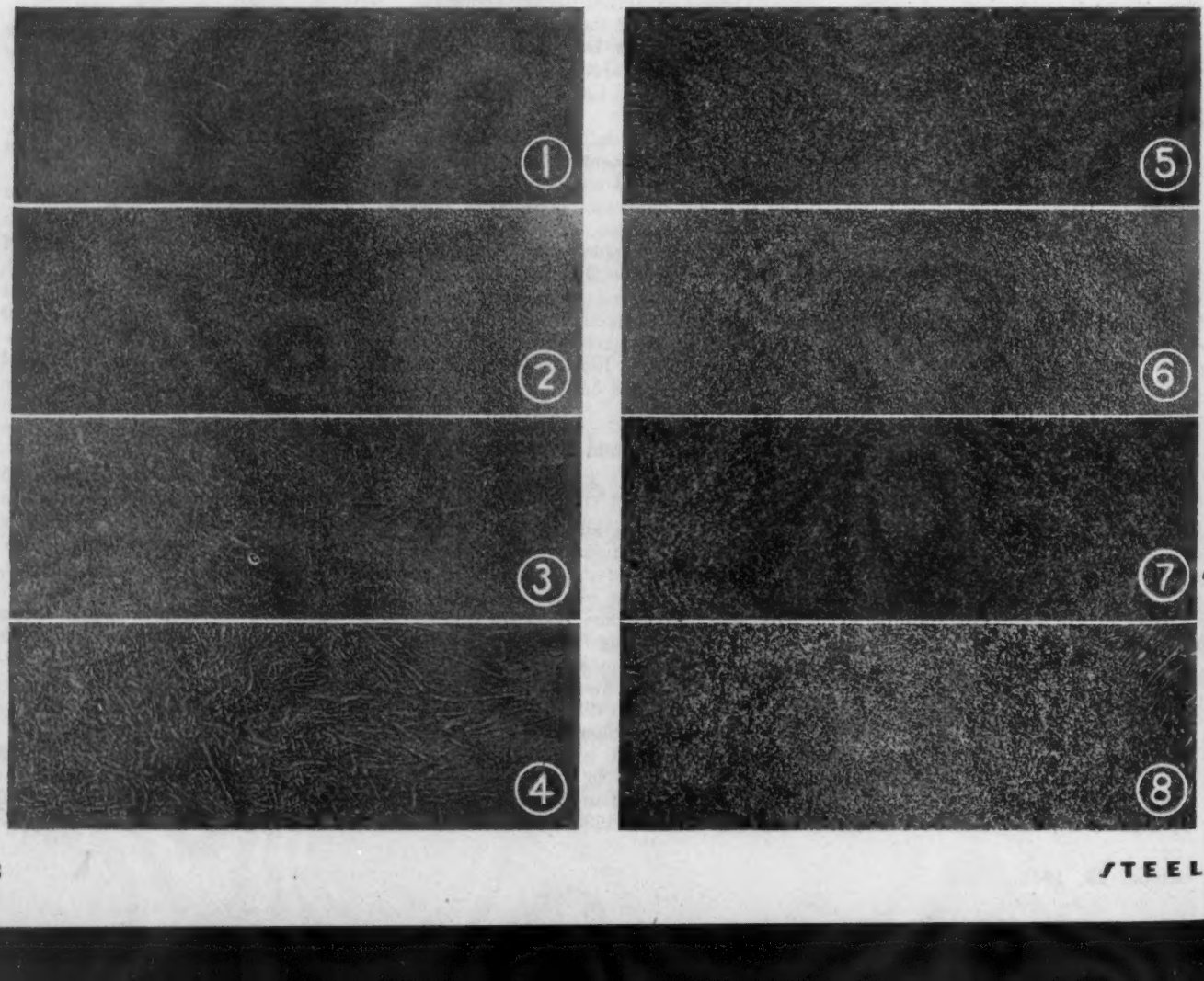
Fig. 4—Domestic electric carbon steel macrostructure

Fig. 5—Domestic crucible melted molybdenum steel macrostructure

Fig. 6—Swedish acid open-hearth carbon steel macrostructure

Fig. 7—Domestic crucible melted chromium-vanadium steel macrostructure

Fig. 8—Domestic crucible melted copper-nickel steel macrostructure



GDIES

By A. S. JAMESON
Works Metallurgist
West Pullman Works
International Harvester Co.
Chicago

metallic inclusions, (3) microscopic examination for annealed structure. Strictly speaking variation in chemical composition outside the specified limits, nonuniformity of hardening characteristics, erratic grain size at various hardening temperatures, surface and subsurface seams and defects would constitute poor quality, but in accordance with the previous paragraph they are not considered in this article.

The method of manufacture, that is, whether the steel is melted by the crucible, basic electric or acid electric, acid or basic open hearth process, cannot be said to determine quality. Steel can be made by one or the other of these processes to meet the quality tests imposed by the user. The size or the shape into which the steel is cast or the method of reduction either by rolling or hammer forging, within certain limits, would also be hardly detectable by consumer's quality tests.

Deep Etch Test: The most popular test imposed by the user of cold heading die steel is the deep etch test. Standards are usually set up on the basis of the degree of porosity after immersion in 1:1 hydrochloric acid or a 10 per cent solution of sulphuric acid, held at a temperature beween 160-180°F for a given length of time.

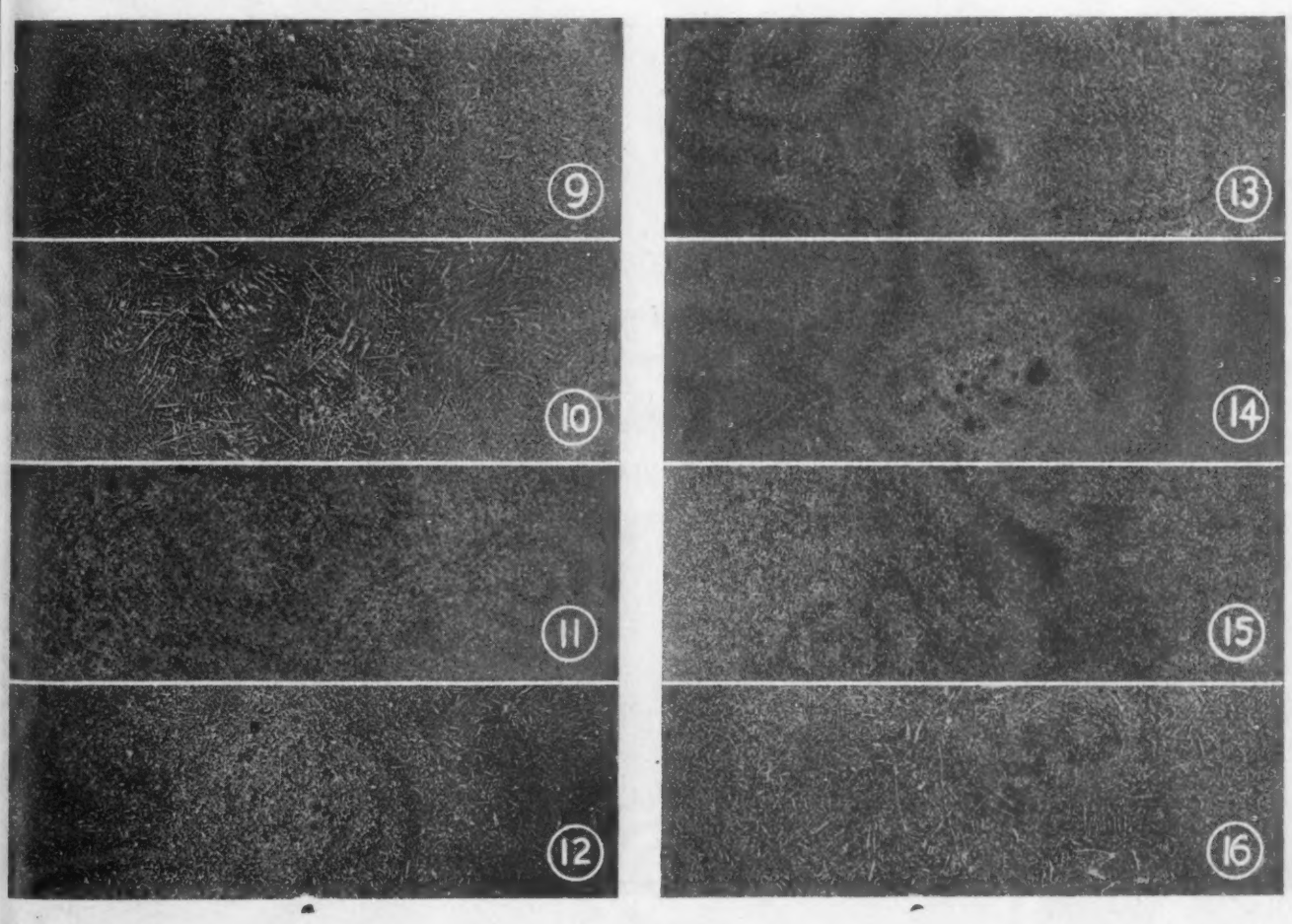
The variable which effects the appearance of the face of the disk submitted to this test is the time of immersion and it is most difficult to control. The degree of porosity recorded is a definite function of the length of time the specimen is immersed in the acid.

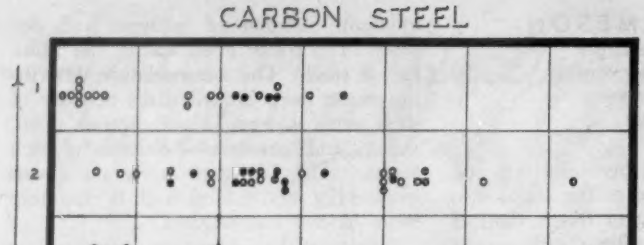
The visual result of acid etching a smoothly finished disk is to produce an indefinite number of patterns and degrees of porosity even within the same bar of steel. The nomenclature describing these deep etched disks consists of such terms as dense, sound, porous, open, spongy and various modifications of such terms. The language is by no means universally understood and is therefore more or less meaningless.

The most desirable means of recording macrostructure is to refer them to a series of numbered photographs, such as Figs. 1-16 inclusive. These consist of disks taken from plain carbon and steel containing small amounts of alloys. These photographs are arranged in four groups representing degrees of porosity. Within each group are various patterns frequently encountered which allow for some numerical classification.

However, these 16 photographs are by no means sufficient to cover the many structures which are produced by deep etching plain carbon and low alloy content tool steel bars. To illustrate, the structure shown in Fig. 18 was met with after deep etching a steel containing 0.20 per cent molybdenum. The peculiar appearance of this macro-etch was due to very large grains of pearlite and segregated areas of ferrite that were

Fig. 9—Domestic crucible melted vanadium steel macrostructure
Fig. 10—Domestic crucible melted copper steel macrostructure
Fig. 11—Domestic electric carbon steel macrostructure
Fig. 12—Domestic electric chromium steel macrostructure
Fig. 13—Swedish acid open-hearth chromium-vanadium steel macrostructure
Fig. 14—Swedish acid open-hearth carbon steel macrostructure
Fig. 15—Domestic open-hearth carbon steel macrostructure
Fig. 16—Swedish acid open-hearth carbon steel macrostructure





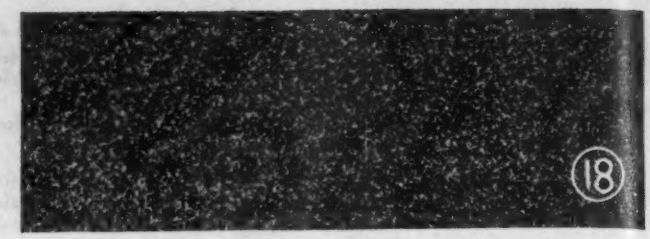


Fig. 17—Chart showing die production vs macrostructural quality (carbon steel)

Fig. 18—Macrostructure of a 0.20 per cent molybdenum steel with coarse grained annealed microstructure. Etched 1:1 hydrochloric acid

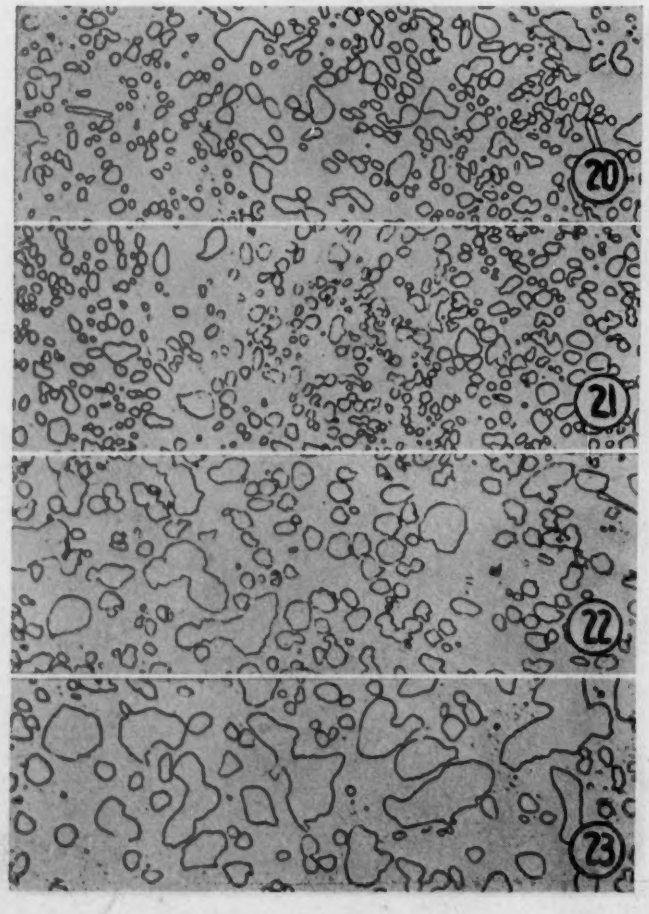
produced in the annealing process.

In order to obtain a complete picture of a bar of tool steel say from 8 to 10 ft long, it appears necessary to sample both ends and the center of the bar as considerable variation is at times encountered. At any rate, where bars are used for special tests and macrostructure is to be considered as a factor affecting the results, this should be done. However, sampling both ends of a 10 ft bar in sizes over 2 in. in diameter is positively indicated for close control.

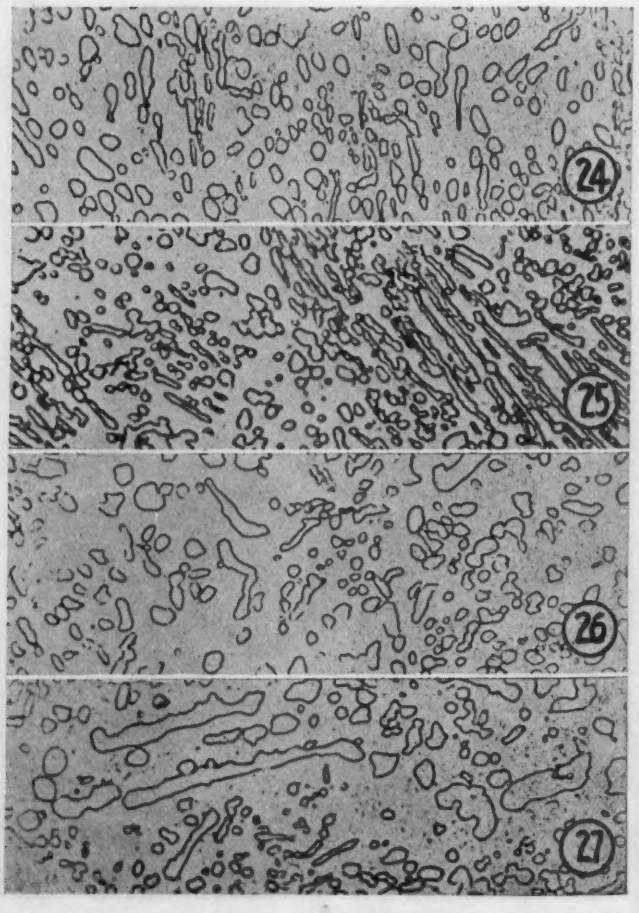
Regarding the effect of the appearance of the macrostructure on the life of dies within groups one, two and three (Figs. 1-12), there appears to be no correlation between die life and macrostructure. See Figs. 17 and 19 obtained by cold heading from C-1040 steel, plow bolts whose form makes it particularly difficult to maintain economic die life. Figs. 17 and 19 are derived from over 200 die impressions and several million bolts.

In group four (Figs. 13-16), however, bars showing this type of macrostructure definitely show irregular die life. It appears that these bars which show very marked and concentrated porosity may contain definite cessations in the material and where these definite breaks occur in the working region of the die they cause early failure of the die. If several dies are made from a bar showing a condition as illustrated in Group 4 (Figs. 13-16), a number of the dies will show normal life and the others will fail in a short time. The dies or a number of dies may crack in the hardening operation. For example, a die made from Group 4, Fig. 13, cracked in hardening, a longitudinal section showing obvious defects. However, it would appear from Fig. 17, that when dies have survived the hardening operation and visual inspection for

Figs. 20, 21, 22 and 23—Micrographs at 1000X showing completely spheroidized structures numbered in order of increasing carbide particle size. These are Type A annealed steel structures. Ordinarily particle size in 24 would be unacceptable



Figs. 24, 25, 26 and 27—Type B microstructures of an nealed steel. Similar to Type A in that they do not contain pearlite but differ in shape of carbide particles. Shown at 1000X. Usually 28 would be unacceptable because particles are large and are remains of the carbide network



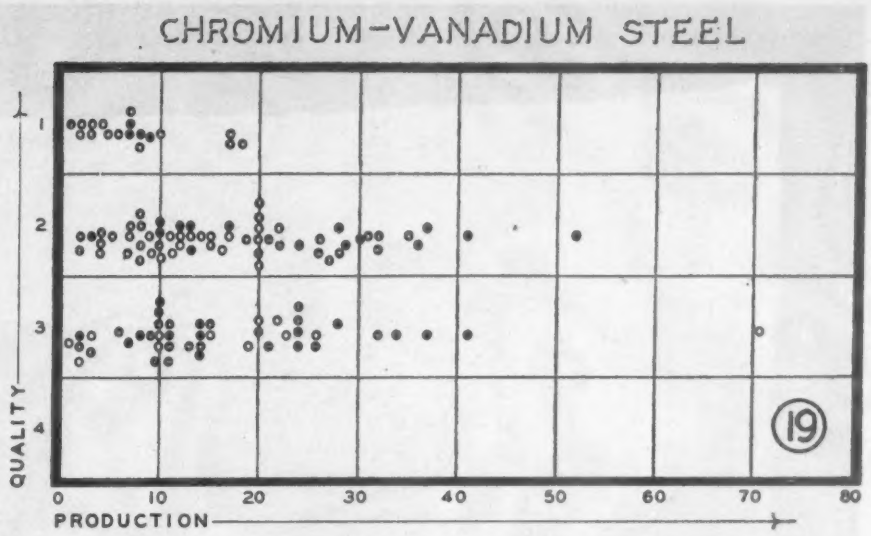


Fig. 19 — Chart of die production plotted against macrostructural quality (chromium-vanadian steel)

defects after grinding, that they perform with fair satisfaction.

Examinations for Inclusions: A microscopic examination for nonmetallic inclusion content is often included as a measure of quality. Until recently no standardized method had been adopted for their recording.

The following method of numerical recording may be employed.

This examination is made at 100 diameters on a polished and unetched sample cut from half way between the center and the outside of a bar in a direction longitudinal to the direction of rolling. Polishing shall be carried out with great care so as to avoid pitting. This usually requires that the sample be hardened before polishing. A method is described below whereby the inclusions may be counted and classified. This method allows direct reference to be made to the number and size allowed in each specific steel specification.

As previously mentioned, the examination is made at a magnification of 100 diameters on a sample 0.375-sq in. in area. A micrometer occular calibrated in thousandths of an inch is used for the examination. Each inclusion over 0.005-in. in length is measured.

Two tables are required to arrive at a numerical inclusion rating, one is a width classification table and the other is a weight classification table. (See p. 121.)

The final classification of the inclusion is known as a weight classification, which is obtained from the length and width measurements by multiplying width classification number (f) by actual length (L).

The actual working of the method in (*Please turn to Page* 121)

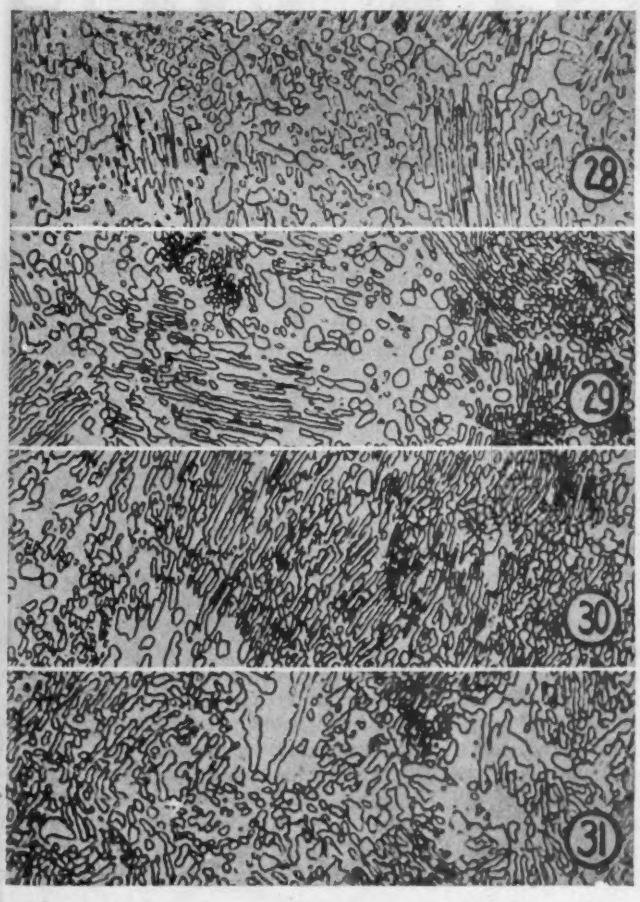
Figs. 28, 29, 30 *and* 31—*Type C microstructures in annealed steel, shown at* 1000*X in order of increasing amounts of pearlite. Ordinarily* 32 *would be unacceptable because of the carbide network*

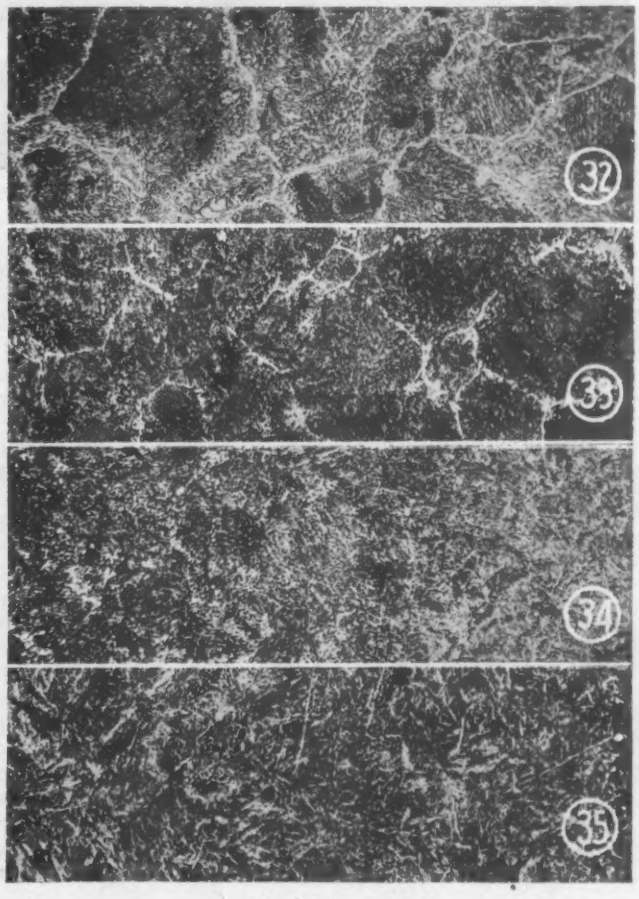
Fig. 32—*Micrograph of* 1 *per cent carbon steel cooled at* 100-200°*F per hour from* 1700°*F showing carbide network and pearlite.* 100*X; Nital etch*

Fig. 33—*Same steel as shown in Fig.* 32 *but further processed by heating to* 1425°*F in* 1 *hr, held* 1 *hr, quenched in brine and tempered at* 500°*F. Hardness is* 58 *rockwell C. Carbide network and martensite;* 100*X*

Fig. 34—*Same steel as in Fig.* 32 *but further heated to* 1520°*F in* 1 *hr, held* 1 *hr, quenched in brine and tempered at* 500° *F. Hardness is* 59 *rockwell C. Martensite and trace of carbide network;* 100*X*

Fig. 35—*Same steel as in Fig.* 32 *but further heated to* 1600°*F in* 1 *hr, held* 1 *hr, quenched in brine and tempered at* 500°*F. Hardness is* 59 *rockwell C;* 100*X*





HAD the crew of the "Scharnhorst" possessed a means of quickly cutting off under water the damaged hull plates that caused her to travel in a big circle, even when running on one engine, she might have escaped the final blows that sunk her and so might have lived to cause the Allies much more trouble, it is reported.

It can now be revealed that the U.S. Navy, in conjunction with American engineers, had perfected and used for some time a fast, sure means of cutting steel at any depth under water—a development that contributed greatly to our combat efficiency since it made it possible to prevent battle-damaged ships from becoming "sitting d u c k s" for enemy bombers and allowed them to get to port quickly for repairs.

When a ship has a hole blown in its hull, watertight bulkheads confine the inflow of water to that section of the ship. Divers are sent down to cut off bent and jagged, projecting plates to retain smooth hull contour. Hole then is plugged by jacking a plate slightly larger than the hole against the inside of the hull to cover the hole. Plate is then welded in place and sealed by welding so that the compartment can be pumped out.

Important applications for underwater rescue work also are seen. For example, if this advanced cutting method had been available at the time the "Squalus" sank in 120 ft of water, it would have been possible to cut a hole in the sub and rescue the men since they all had Momsen "lungs", it is reported.

In a recent interview, G. W. Wattles Jr. president, Ellwood Products Corp. and United Tube Corp., Ellwood City, Pa., explained how the improved underwater cutting process was developed at the Navy's experimental station at Annapolis working with engineers of Ellwood Products and United Tube.

The new underwater cutting method is a variation of the standard "gas cutting" process so well known and widely employed for cutting ferrous materials IN AIR. Pure oxygen gas combines chemically with the ferrous material to oxidize or "burn" rapidly, o n c e the "kindling" or "ignition" temperature has been reached.

In conventional gas cutting equipment for cutting in air, acetylene is mixed with the oxygen at the torch to provide the preheating required. As soon as the steel has reached a bright red (between 1400 and 1600° F), additional oxygen is turned on and cutting occurs by the chemical reaction of the metal with the oxygen stream. The erosive action of the closely controlled oxygen jet also washes away considerable of the unconsumed or molten metal to add to the efficiency of the process.

While this works well in air, difficulties a r e immediately encountered when trying to operate the torch in deep water, where of course gas pressures must be increased to compensate for

the pressure of the water. At a depth of about 14 ft, acetylene pressures pass the point where it is practical to operate the torch, according to Mr. Wattles. This then makes it impossible to cut steel with the usual torch at depths greater than approximately 14 ft.

New developments in gas cutting equipment include a torch that employs an air jacket to blow the water away from the oxyacetylene flame. At the same time the air stream is so designed as to help "suck out" the fuel gas, enabling acetylene pressures to be held below the limiting value. Such advances may considerably extend the depth of the oxyacetylene cutting.

Combines Arc, Oxygen Jet: In the improved underwater cutting method described here, a special hollow electric arc cutting electrode is used with a jet of oxygen forced through the hollow core. Here the electric arc at the electrode tip supplies the heat required for igniting the steel while the oxygen jet produces the same chemical reaction and mechanical erosion that occurs with the conventional gas cutting torch in air. The combination has proved to be an exceptionally effective method of cutting steel under water. As no explosive gas is used in the process, safety of the operator is assured.

The most important advantage is that the equipment as now perfected operates perfectly at depths up to 280 ft (simulated in test tanks) and there is no reason why it should not work well at any depth.

Many Problems Licked: Success of the method hinges entirely upon the electrode and its holder. In order to minimize time out for changing electrodes when cutting, it is necessary to use an electrode material with minimum burn-off rate. Experimental work involved over 20 different materials.

A hollow carbon rod was found to be best from the point of minimum burn-off but had to be discarded because such rods are frangible, that is they break easily. Various alloys with nickel, copper, etc. were also tried; but of all the materials tested, plain carbon steel proved just as good as anything. So rods are made from plain SAE-1010 steel.

Another problem was to produce the hole through the electrode. The rod itself is 14 in. long, $\frac{7}{16}$-in OD with the hole or ID only 0.100-in. Rod as finally perfected is made by cold drawing or swaging welded tubing. The tube must be swaged over a mandrel to maintain close tolerance on the inside diameter as any variance in the orifice would affect the velocity of the oxygen stream and insufficient penetration would result.

Another method of making the hollow electrode is by wrapping copper coated strip around a mandrel to form two complete turns. Wound strip then is brazed together into a solid wall tube in a controlled atmosphere furnace.

Coating the Rod: Developing a satisfactory coating was troublesome. The coating must protect the rod from welding when any portion of the rod other than the tip may accidentally contact the work, or the operator may find his rod stuck to the side of the cut.

Extruded coatings gave trouble from chipping. Dipped coatings also proved unsatisfactory for the same reason. A wrapped coating was found to be the best solution, but that did not solve the entire problem. It is necessary that the coating burn off at just about the same

(*Please turn to Page* 136)

TYPICAL CUTTING SPEEDS
(For Depths of Water from 10 to 40 ft)

Thickness of Plate Inch	Current (DC) Amperes	Voltage (DC) Volts	Oxygen Pressure PSI	Minimum Cutting Rate In/Min	Burn-Off Rate *
¼	300	25-30	15-20	35	1⅞
½	300	30-35	25-30	28	1½
¾	300	35-40	30-35	23	1⅜
1	300	40-50	40-50	20	1⅛

Note:
Voltage and current values listed are when using direct current. Values when using alternating current will be similar but cutting will be at slightly less efficient rate.
* Burn-off rate is given in linear inches of plate cut per lineal inch of electrode consumed, and are minimum values.

. . . . now possible at any depth by simple equipment that cuts steel and other ferrous metals at high speed. This valuable wartime development seen to have important applications in salvage, harbor clearance and certain construction operations. Also advantageous for cutting in air, typical job being done in 66 per cent less time than required by conventional method

By G. W. BIRDSALL
Associate Editor, STEEL

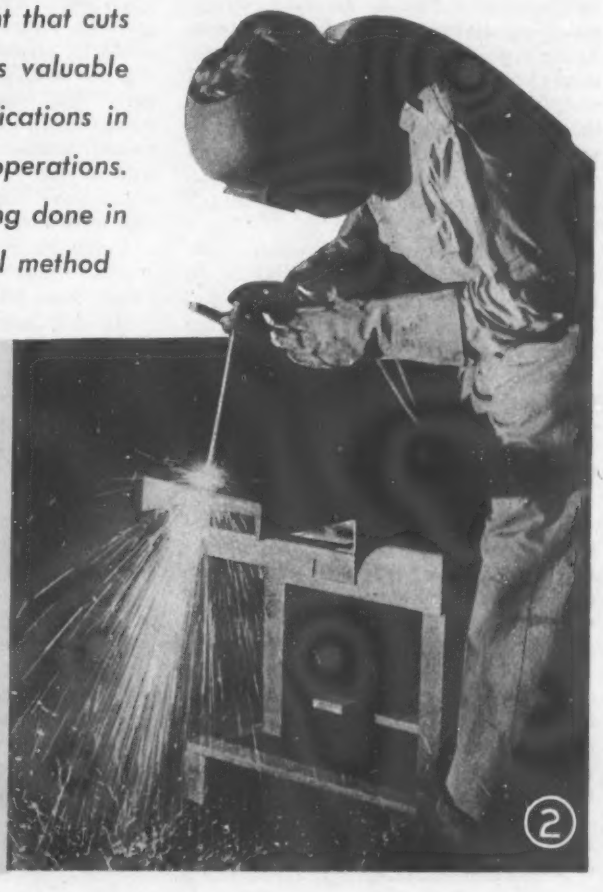


Fig. 1—View of underwater cutting electrode in operation in a test tank as seen through glass window of tank. Oxygen jet and gases from electric arc produce considerable agitation of water on exit side. United Tube Corp. photos

Fig. 2—Its great speed makes new electrode also valuable for cutting in air, as usual cutting job can be completed in 66 per cent less time than conventional torch cutting. Improved method is especially valuable in cutting cast iron because the molten steel from the rod helps "wash" the molten iron from the cut, greatly increasing the efficiency of the cutting action

Fig. 1—Long narrow parts such as these are handled on cradles, lifted and moved about by means of power trucks. Provision for nesting is incorporated in some cradle designs

INDUSTRIES' experiences in World War II apparently have set in motion a strong trend toward increased use of mechanized materials handling equipment, especially power industrial trucks. These types of trucks were in the early stages of evolution during the first world war; their development kept pace with that of other important mechanical devices in the 20's and 30's. But it took this war with super-demands for production and transportation to reveal their full potentialities.

The significant fact for industry now reconverting to peacetime products is that use of power trucks co-ordinates and increases the effectiveness of other equipment for manufacture and distribution.

How did the trend develop? How will it affect basic industries now the war has ended? What are the advantages to users —in production and sales? How are the trucks used today? What about pallets and the palletizing system?

STEEL asked a leading builder of trucks these and similar questions. The answers are "briefed," but they will give readers an up-to-the-minute understanding of what is meant by "Industrial Logistics" and "Masterunit Loads."

How Trend Developed: The impetus came from many directions mainly due to the need for conserving manpower while increasing output of war materials and getting those materials to their destination quickly as possible.

Trucks were in use in every basic industry before the war, the largest number in metal-producing, metalworking plants and railroad shops. It was well known that one operator with one truck could do five to ten times what he did do without a truck. Further, that many tasks impossible, difficult or dangerous for men could be accomplished readily by applying this mobile source of power. In the early 30's, there was little incentive to mechanize. When conditions were reversed, however, more trucks were called into service. They are used in many diverse ways, including some applications that were never thought of before the war.

Industries have "learned" how to use trucks to make the work of men and machines more productive.

Another urgent demand for trucks stemmed from the fact the Army and Navy were up against the greatest materials handling job in history. Moving millions of tons of food, clothing, munitions imposed new problems. Yet one of the most difficult was solved by a simple method.

This was done by first taking into consideration dimensions of available spaces in freight cars and cargo vessels and designing packages so that when assembled in "Masterunit Loads" on pallets such loads could be moved by means of fork trucks and fitted into those spaces. Another important feature of the system was to keep the unit loads intact until they reached their destinations. This method insured *mass movement* of goods, keeping pace with mass production and mass consumption.

The original experimental work was done by the Navy's Bureau of Ordnance in materials handling laboratories, with cut-away scale models of warehouses, freight cars, docks, cargo ships, just as some manufacturers for years had used scale models in studying plant layout. Government contractors were instructed to ship goods on pallets; if they didn't know how, the government stood ready to show them, going as far in some instances as to furnish the trucks out of "truck pools."

Thus one "bottleneck" after another was broken, and materials in endless variety went forward in a steady flow. Unit loads assembled in hundreds of factories in the United States have been transported to bases near the fighting lines, and baled battlefield scrap has been returned to the United States—on pallets.

The Navy always impressed this message on its suppliers: "Ingenuity and vigilance in materials handling can be translated into shortcuts almost as substantial in the aggregate as the capture of new supply routes." Trucks thus came to be recognized as vital links in the nation's transportation facilities. They reduced costs and insured faster, larger production and movement of goods. Practically all Army and Navy warehouses now hold goods stored on pallets so the system, as far as they are concerned, is permanent.

Effect On Peacetime Industries? Basic principles are the same in peacetime as in war. One effect of this wartime experience has been to make all industries more conscious of the economies which may be obtained with improved materials handling methods. These may be "briefed" as follows:

"INDUSTRIAL LOGISTICS"

1. Saving in manpower.
2. Obtaining the highest rate of output from other machines and facilities whose operations depend on a corresponding high level of handling efficiency before, during and after the actual manufacturing processes.
3. By utilizing "air rights," valuable space up to the ceiling or any practical height in factories, warehouses, freight cars and ships in tiering with fork trucks.
4. By the longevity of the trucks. In consistent service they pay for themselves in a few months, "stand up" to the job many years. A truck to do its work in the beginning must be constructed so substantially that its "normal life" extends over 10 years or more. A considerable number now in service were built 20 to 25 years ago.

Innumerable time studies show conclusively the substantial saving in manpower. Some of these represent results reported by the Bureau of Ordnance, such as one man loading a freight car in less than 1 hour by means of a fork truck and pallets, as compared with approximately 2 days otherwise.

In the transportation of nickel from a Canadian producer's plant to distributors and consumers in New York, Pennsylvania

(*Please turn to Page* 130)

Fig. 2—Lift truck which has carried skid box of parts from previous operation, delivers box alongside next work station and elevates onto tilting frame. Parts feed out by gravity to machine operator

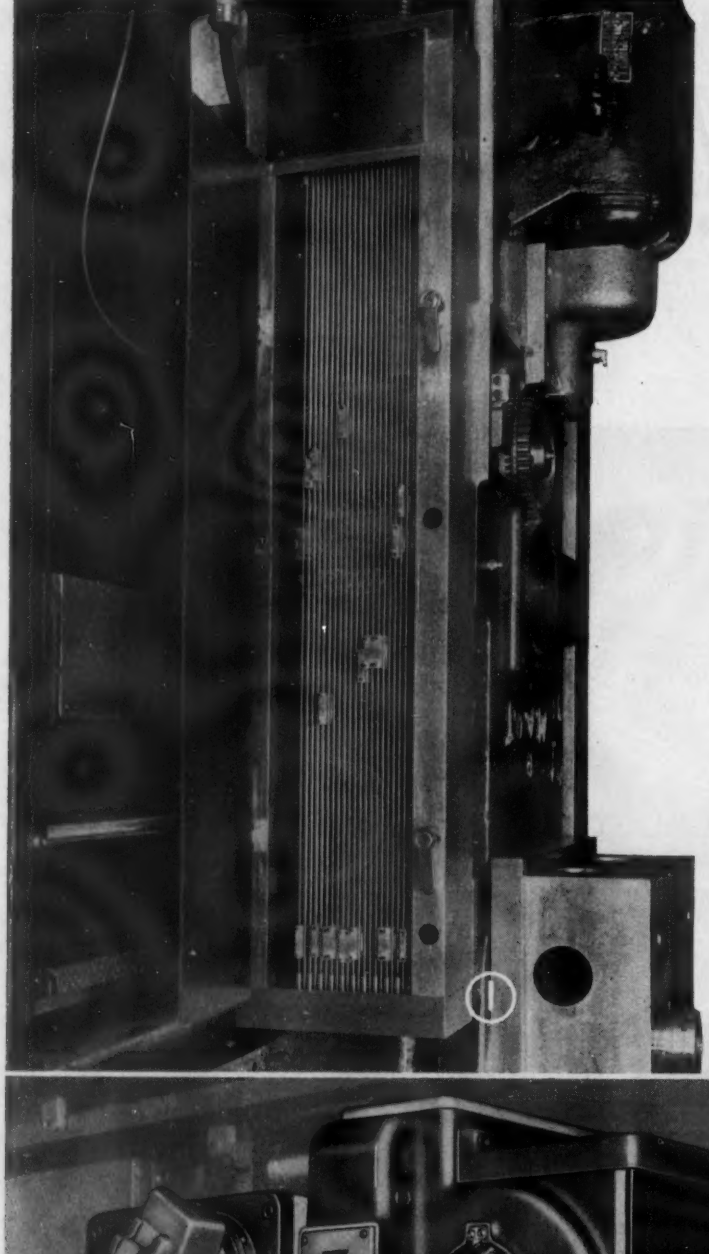
Fig. 3—An industry's "floating floor": A few of the hundreds of steel skid boxes for moving material and parts in process from one work point to another in Chevrolet's Gear, Forge and Axle Division, Detroit. General Motors photos, courtesy Elwell-Parker Electric Co.

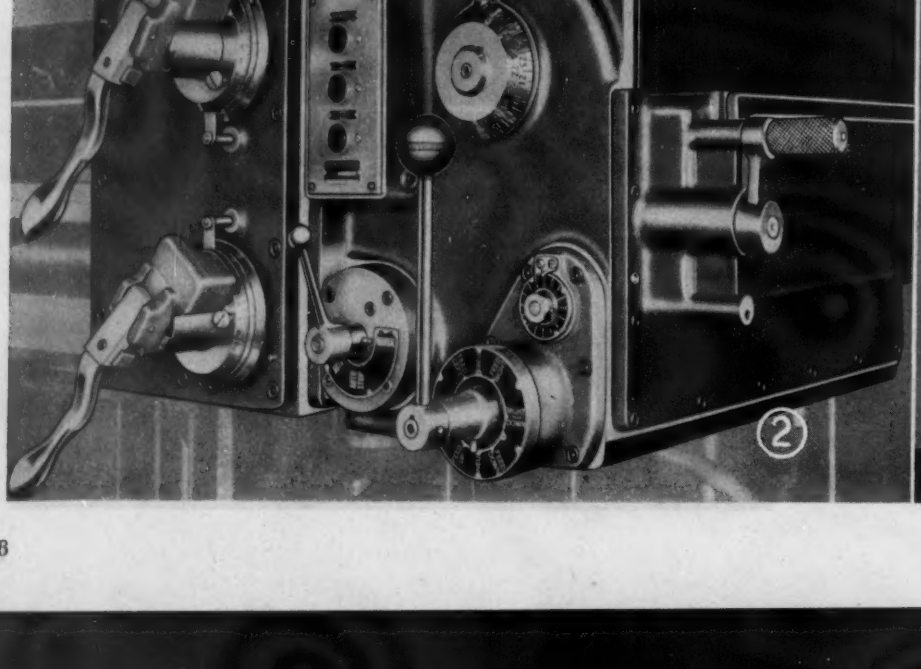
Fig. 4 — Two of many different types of steel skid boxes for handling 1 and 2-ton loads of metal parts as a single unit. Construction of skid box often identifies it as having come from a related plant supplying parts or doing processing

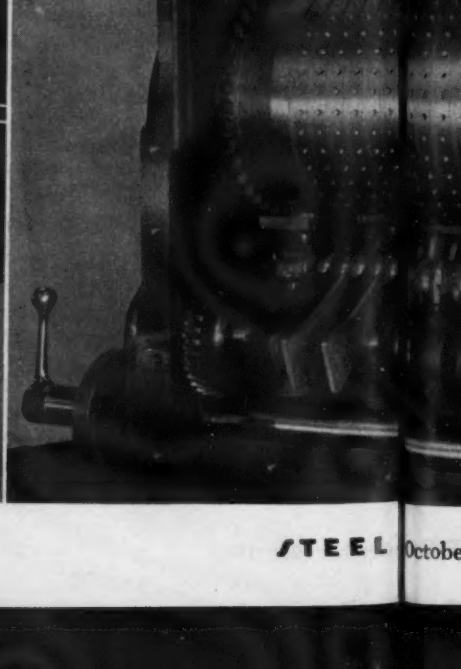
Unique System of AUTOMATIC CONTROL

Can Handle 39-Function Cycle

Without depending on conventional cams, it gives precise, high speed repetitive performance over full working range of machine—at same time allowing immediate switch to manual operation without disturbing settings of automatic cycle







OF UNUSUAL INTEREST at this time, when there is a strong trend toward self-actuating industrial machinery—machine tools in particular—is a development which has been carried out by engineers of the Bullard Co., Bridgeport, Conn.

Although this unique system, characterized as Man-Au-Trol, actually was worked out in practical form, and a pilot model machine embodying it built prior to the war, government secrecy orders have prevented general revelation of its details until now. On Oct. 11, 1945, officials of Bullard Co. were hosts to a large group of editors representing the technical journals, including those covering the metalworking field. This article is based on this first, and extremely interesting, public demonstration, and on the description given on that occasion by E. P. Bullard III. inventor of the system.

While it requires no stretch of the imagination to realize that modifications of this control could be applied to an almost endless variety of machines and processes, its application will for the time being at least be limited to machine tools of Bullard manufacture. The main demonstration—on the occasion of the lifting of the veil of secrecy—was made on a Cut Master vertical turret lathe. This machine has the necessary stamina to stand up under the heavy, continuous duty imposed by automatic control, which allows a machine few "breathing spells."

The vertical turret lathe, with Man-Au-Trol units applied, is shown in Fig. 5, this being a machine of 30-in. capacity. At first glance it will appear almost identical to a manually operated machine of corresponding model. However, upon further study it will be noted that identical cabinets extend to the right beyond the side head support and beyond the cross rail, and that there is an oblong box above the cross rail. One of these cabinets, as it appears when disassembled from the machine appears as Fig. 2. This embodies the main control and feed works. The insides of the unit are revealed by Fig. 3, in which the control drum, literally the "brain" of the system, is exposed to view.

Having thus exposed the "brain", it now is in order to reveal the "nerves" of the system. Just as there are two co-ordinated "brains", one for the main head and one for the side head, so also are there two co-ordinated "nerve systems" for each of the above mentioned sections of the machine. One of these is housed in the oblong box, already mentioned, which lies horizontally above the cross rail. The other and identical one, the insides of which are exposed in Fig. 1, is in a vertical position. It is the nerve center for the head which moves vertically.

Each box has 39 wires—"banjo wires" the inventor calls them—carrying adjustable stops. Approximate adjustment of these stops is made by loosening screws and sliding them along the wires. Fine adjustments then are made by moving the wires themselves by means of a micrometer wrench. That process is something like tuning a stringed instrument. The stops are set so that as any cut or any other movement of the slide in question reaches a predetermined point, a sensitive limit switch is tripped. Two rows of these limit switches—one switch for each stop block—are traversed along behind and parallel to the banjo wires by the movement of the slide in question, the electrical impulse from the tripped switch stopping the corresponding feed instantly. The small motors, which can be seen in Fig. 5 at the end of the vertical and horizontal slides, unlock, index, and relock the tool turrets. Man-Au-Trol actuates them at the proper moments in the cycle.

It should be explained at this point that the control employs electrical hydraulic and mechanical principles — all three working in co-operation with each other. As the inventor expressed it, "The brain wave is electrical, the strength mechanical, and the life blood hydraulic." In other words, when the stop on one of the 39 wires releases an electrical impulse, a hydraulic clutch releases the feed, the drum indexes, which in turn actuates other hydraulic clutches which set the next step in the cycle into action.

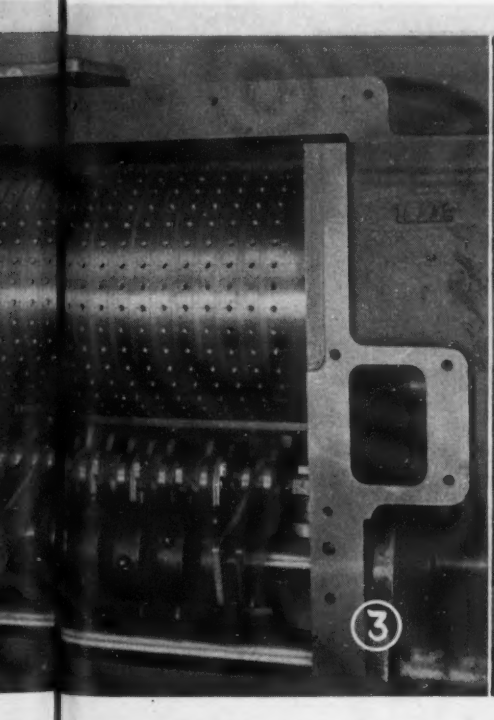
Actual feeding of the tools and other motions of the slides are carried out by the regular mechanically driven lead or feed screws or worms to their full range where the work requires, see Figs. 4, 5 and 6. In other words, the machine has the same large size range as an automatic

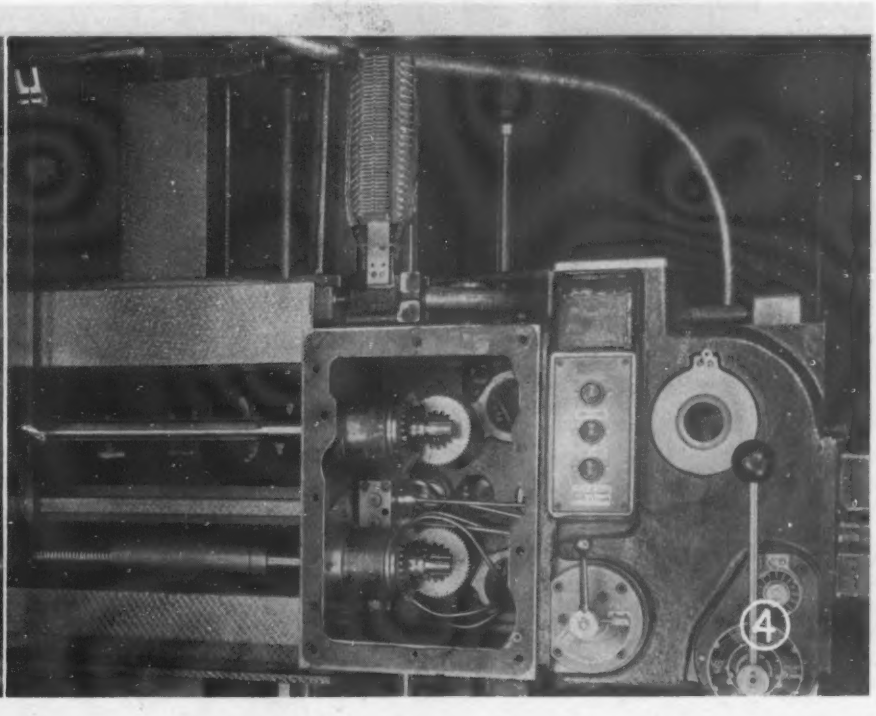
Fig. 1—One of the two "nerve centers" of automatic control through which work sizing is accomplished. Note adjustable stops on "banjo wires", behind which are two banks of limit switches traveling with slide

Fig. 2—Automatic control unit and feed works of main head, showing convenient grouping of pushbuttons, levers and indicating dials

Fig. 3—Here is the "cranium" of the control unit opened up to reveal its "brain" or program drum. This drum indexes around step by step, causing adjustable dogs to instigate up to 39 functions according to prearranged plan. Dogs are not shown

Fig. 4—Control unit with end plate removed to reveal portion of feed works and connections to feed rod and lead screw. Drum is not yet in place—Its bearing being at upper right





as it would have if manually operated. It is not limited to the length of "throw" of coins, as is generally true of conventional automatic machinery.

What the automatic control really does is to operate the machine very much as a top notch human operator would, but precisely and repetitively, and much faster than any human operator could. The setup of drum stops, banjo wire stops and tools—which initially takes some little time on the part of a person familiar with the system—is done according to an engineering layout which has been worked out for maximum efficiency. Once everything is set and the tools adjusted, the machine repeats its cycle over and over. All that the operator does is to load and unload the work and push the button to restart the machine. The machine never hesitates or makes any false move.

Lest the impression be given that the machine is only an automatic when equipped with this control, it should be explained that at any point in the automatic cycle the movement of a small single lever (see Figs. 1 and 2), completely cuts out automatic actuation and converts the machine to manual control. This is no way disturbs the automatic settings. Thus if, in the midst of an automatic run, two or three different jobs must be machined in a hurry, the lever can be thrown, the emergency job run off manually, and the automatic run resumed with minimum loss of time. Under manual control, the turret motors are push-button operated.

As a matter of fact it is customary to take advantage of this feature when setting up the machine for an automatic run. The sample piece is chucked, and the tools are run through each cut manually, the Man-Au-Trol settings being made at the completion of each cut. Then, when all the operations have thus been run through and all the functional stops set, the lever is thrown over and the machine becomes 100 per cent automatic on that particular job. Incidentally, through micrometer setting of the banjo wires, limits to "tenths" can be attained.

A typical sequence of operations carried out through automatic control might be as follows: Traverse main head into a predetermined position; feed it down at the rate of 0.015-in. per revolution of work for a distance of exactly 6 in.; change down feed to 0.008-in. per revolution of work and feed tool into a corner; then feed outward to face a shoulder at 0.015-in. per revolution for a distance of ½-in.; withdraw tool from work to prevent scoring and bring head back at high speed to its original starting position. At the same time the side head may be carrying out another cycle of operations, the two being co-ordinated so that there will be no interference between them.

As mentioned before, any number of functions up to 39 can be handled by each head. However, on pieces calling for say only 10 or 15 functions, only that many need be employed. The machine does not have to go through any useless motions. Unused functions are skipped entirely.

Sizing of work can be corrected while work is in progress, thus making it possible to adjust for tool wear. In many cases, one tool can be employed for sev-

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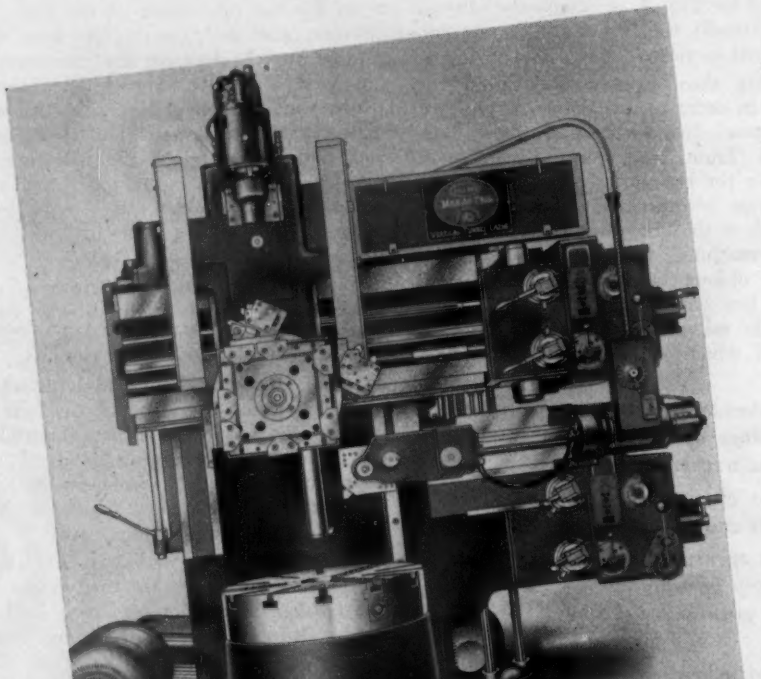


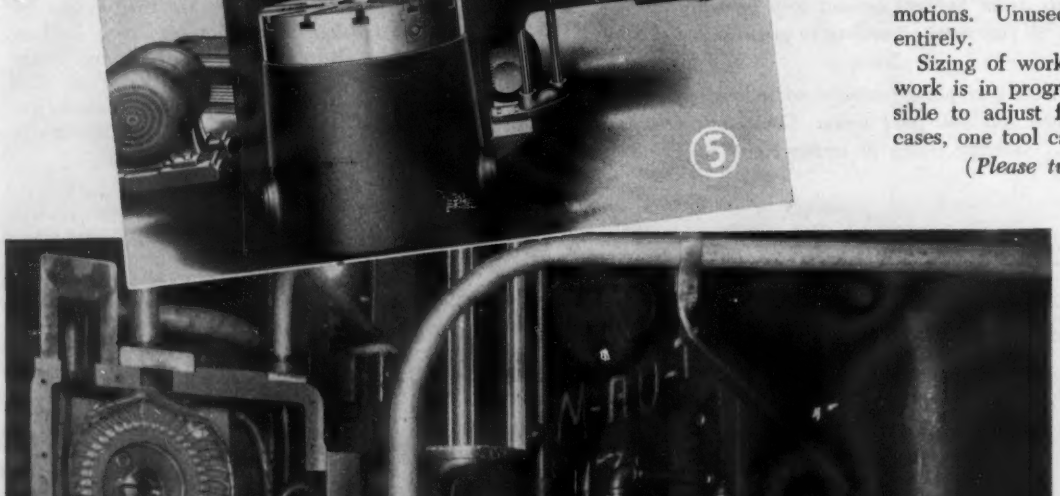
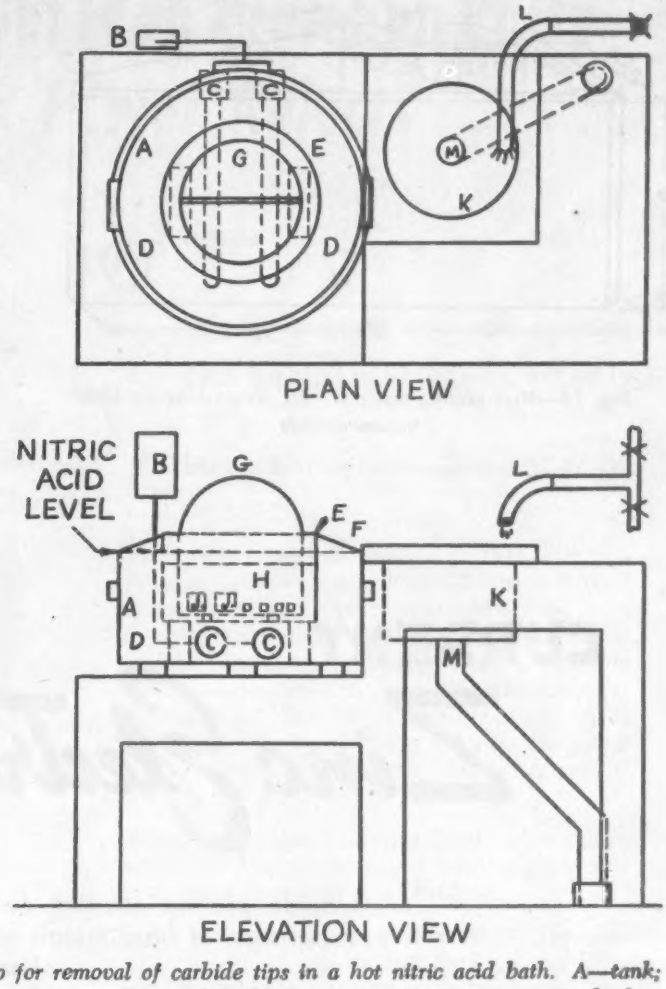


Fig. 5 — Vertical turret lathe equipped with automatic control units. This is a 30-in. machine with turrets both on vertical and side heads

Fig. 6 — Rear of Man-Au-Trol unit with cover removed to show junction box through which the electrical "nerve system" sends its impulses

HOW TO REMOVE AND REPLACE CARBIDE TOOL TIPS



Typical setup for removal of carbide tips in a hot nitric acid bath. A—tank; B—switch; C—heaters; D—sand bath; E—pyrex jar; F—apron; G—basket; H—nitric acid; J—tools; K—sink; L—water hose; M—drain

SEVERAL methods of removing carbide tips from cutting tools are employed by the various divisions of the General Motors Corp. Such removal of tips offers a means not only of subsequently reclaiming the carbide for application on a different tool or for breaking up and resintering into a new shape, but also permits a new tip to be placed on the same tool shank so that it can be continued in use.

The only time there is no point in salvaging operations is when it is possible to use the carbide tipped tool until the entire tip has been worn away by regrinding operations. Chevrolet Division at Muncie, Ind., reports that this is their practice—complete utilization of the tipped tool.

At Eastern Aircraft Division, Linden, N. J., carbide tips are brazed onto the tool shanks with Easy Flo No. 3 as the standard brazing alloy because it permits tips to be removed and replaced with ease since the alloy melts at a comparatively low temperature.

Here removal of tips is accomplished by heating the tools in an electric furnace to a temperature slightly above that employed in brazing. At this temperature, the tips are easily lifted off. They are immediately placed in line so they will cool slowly—as it is important to avoid sudden temperature changes.

Replacing the tip is then done as follows: Grind new tip to fit shank recess. Clean tip and shank with carbon tetrachloride, avoiding contact with the fingers. Apply flux liberally to milled recess. Preheat shank in electric furnace. Remove heated shank from furnace and apply strips of Easy Flo No. 3 ribbon in the recess, followed by placing the cleaned and fluxed tip in position. Replace tool in furnace and hold till brazing alloy melts. Press tip firmly into recess and remove from furnace without relaxing pressure on tip. Plunge into lime for slow cooling.

Special attention is given the type of steel used for the shank, Meehanite metal being used for all standard shaped carbide tipped tools. In certain instances a good grade of tool steel is employed where the cutting tool must overhang its holder. Shanks are made as long as permissible so shank can be cut off and remilled for a new tip when the old recess is no longer usable.

Vascoloy Ramet "Tantung G" is used for tips on flat form tools to replace high speed steel with a high degree of success, it is reported.

At Harrison Radiator Division, Lockport, N. Y., most tips are removed in a nitric acid bath. Since hydrogen brazing furnaces are continually in operation here, new tips are put on by attaching with a wire and copper brazing them in one of these furnaces.

A 5-kw electric induction heating unit is also available for brazing and removal of tips.

In developing the nitric acid method of removing tips, considerable work was done here, numerous tests being made using various times and temperatures. Starting cold and heating to 140° F followed by 30 min at that temperature resulted in removal of 65 per cent of the tips. Starting cold and heating to 130° F followed by 45 min at that temperature was also tried, with other variations. These were not so successful, averaging from 18 to 42 per cent removal.

Tests with cold nitric acid gave 90 per cent removal at 174 hr, 85 per cent at 151 hr. These tests indicated that the cold treatment for approximately a week (168 hr) has an advantage over other methods in that it produces a higher removal percentage, eliminates the need for special equipment, and is easier and safer to handle.

As a check on the effect of continued immersion in cold nitric acid on the steel shank material, a piece was stripped of oxides, weighed and put in cold acid. Each day the specimen was washed, rubbed dry with a towel and weighed. Immersion for 202 hr showed a total loss of 0.6505-gram or 0.948 per cent. This amounted to an etch on the surface of 0.0012-in.

Precautions followed at Harrison include wearing of goggles, rubber gloves and rubber apron by the operator; locating the operation in an area adequately ventilated and drained with a cold and hot water hose at hand; proper neutralization of acid spills; degreasing and drying of tools before placing in bath; arranging tools so they do not touch each other in bath, no stacking; complete submersion of all tools; leaving tools undisturbed during entire period.

At Oldsmobile Division, Janesville, Wis., the carbide tips are removed by heating in a gas furnace and then jarring tip off when brazing alloy melts. Copper brazed tools are heated to 2300° F

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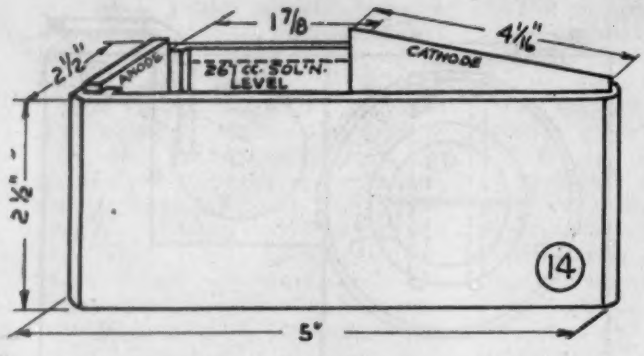


Fig. 14—Hull plating test cell. All dimensions are inside measurements

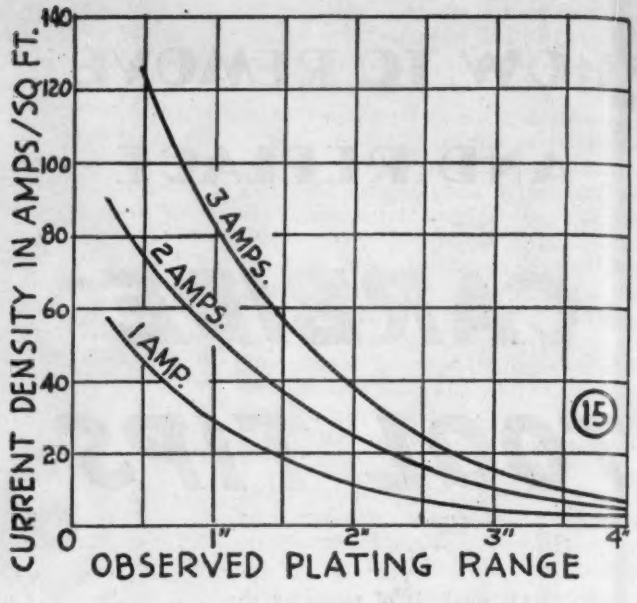


Fig. 15—Conversion curves for Hull cell test

CURRENT Zinc Electroplating PRACTICE

Cyanide plating solution control and maintenance and preparation of base metals are discussed in fourth article of series

By DR. ALLEN G. GRAY
E. I. du Pont de Nemours & Co. Inc.
Cleveland

THE result of improper bath maintenance in "bright" zinc plating is either lack of brightness or low cathode efficiency, or both, and these effects do not develop gradually but are noted immediately. In plating with dull straight cyanide zinc plating baths, the principal effect of improper bath maintenance is low cathode efficiency which becomes apparent only upon determination of zinc deposit thickness. Thus, the proper operation of any cyanide zinc bath whether "bright" or dull necessitates analysis and adjustment of the bath composition at frequent intervals. Standard approved methods of analysis are available[4] for determination of *zinc, total sodium cyanide, sodium hydroxide,* and *sodium carbonate* and these analytical methods will not be discussed in detail here.

In order to check the plating range of a cyanide zinc bath a plating test may be made using a small volume of solution. Any additions that may be indicated for the large volume of solution can be checked on a small scale to verify the effect. The most widely used plating test cell for this purpose is the Hull cell[4]. The Hull cell has been described before[5] and details of its construction need not be repeated here. The function of the cell is to provide by geometric configuration a cathode deposit on a flat surface that records reproducibly the character of electroplate produced at all current

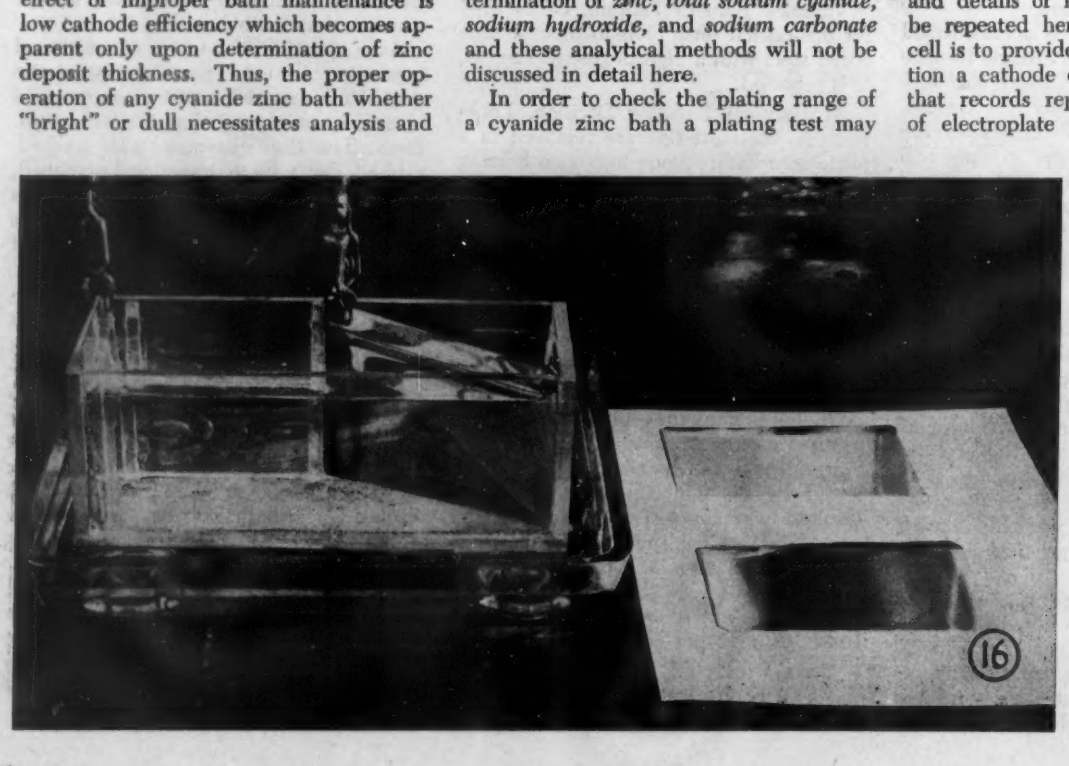
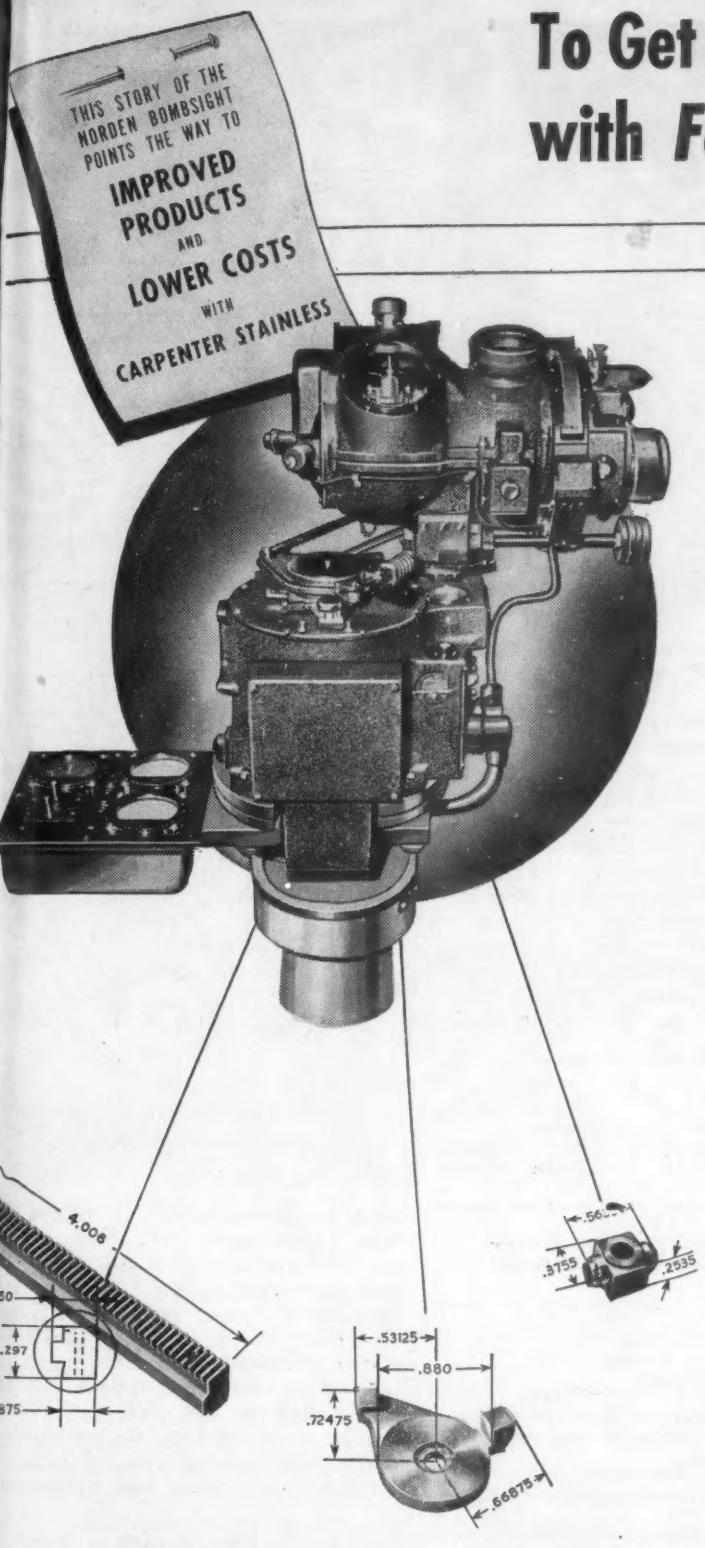


Fig. 16—Hull test cell used with bright plating solution. Cathode plates show bright and dull areas

To Get *High Precision Parts with Fewer Rejects* . . . . .



. . . use the Stainless that met exacting Norden bombsight requirements

● If ever a job called for close tolerances, plus product dependability, it was this famous bombsight.

The requirements were tough. For instance, one small piece—the heart and nerve center of the bombsight—was held to a tolerance of ± .0001". The part contained less than 1¢ worth of steel, yet was listed as an $8 cost item. Stainless was a "must" for this and many other vital parts, because corrosion resistance, wear resistance and a high strength/weight ratio were necessary.

Why Carpenter Free-Machining Stainless was first choice for these bombsight parts is a story that can now be told.

You can sum it up in one word—"dependability". Said one of the factory superintendents: "Experience with material obtained from other sources has convinced me that we have *less rejections, better machining time, less trouble* in straightening, and *better tool life* with Carpenter Stainless No. 5 bar stock."

Your own precision requirements may be less severe, but you will benefit by the consistent, money-saving uniformity of Carpenter Free-Machining Stainless. Made to tool steel standards in a tool steel mill, Carpenter Stainless guarantees top-flight performance.

Try Carpenter Free-Machining Stainless Steels and see what a difference they make in your production set-up. Your nearby Carpenter representative will gladly help you in solving your Stainless problems. Call him or write us at the mill.

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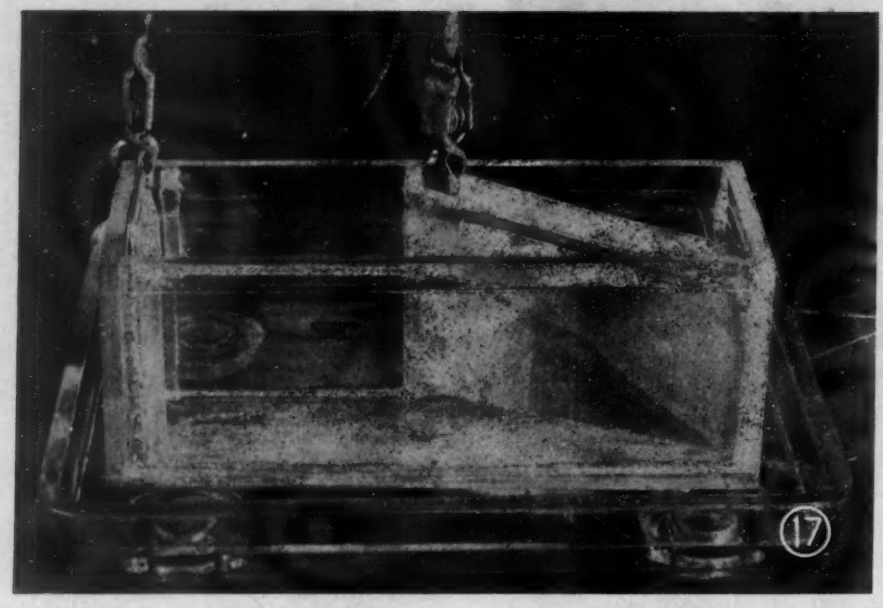


Fig. 17—Bright zinc plating test in operation

densities within the entire operating range. Optimum current densities to use may be determined from the mid-point of the acceptable plating range. The limits of the ranges should not be construed to be average current densities for a plating tank because almost any article in plating is subjected to a wide range of current densities simultaneously. Baths for still plating should show acceptable or good plating ranges from low to high current densities over at least one-half of the cathode plate area; baths for barrel plating should show an acceptable range over at least the lower one-third of the plate for satisfactory results.

The Hull plating test cell was first described in 1939[36] and since that time has been modified to a smaller, more convenient size and the curves and formula giving current density have been changed accordingly. The cell is so constructed that the flat cathode, 2½ x 4 in. is maintained at a fixed, acute angle with the opposite side of the cell, permitting free flow of current to one end of the cathode, with gradual restriction of the cross sectional area for current passage to the other end of the cathode. Fig. 14 illustrates the present, recommended shape and dimensions of the Hull cell which contains 267 ml. of solution. This volume was selected for convenience in calculations because 2 *grams per* 267 *ml.* of an addition are equivalent to 1 *oz per gallon.* Fig. 15 gives the curves representing the current densities at various points on the cathode plate for 1, 2, and 3 amp total current. Depending on the extent of practice and observation in the use of the Hull plating test cell, such plating tests can be made the basis for establishing the optimum concentration of addition agents and the primary bath constituents

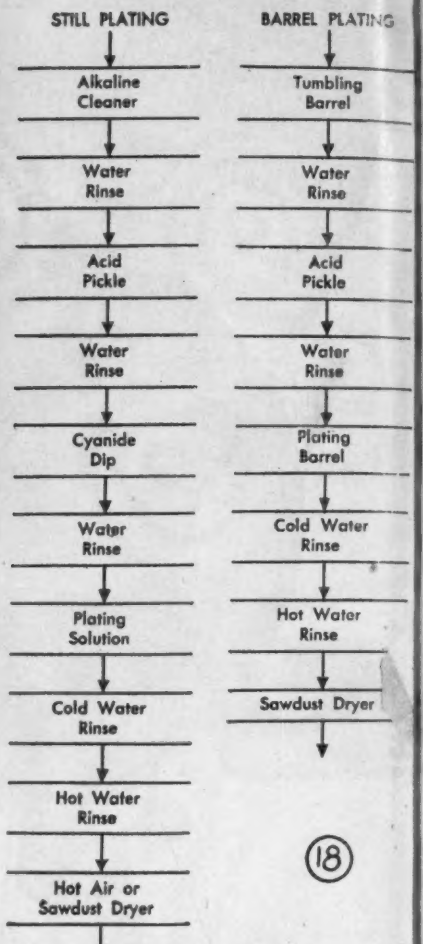
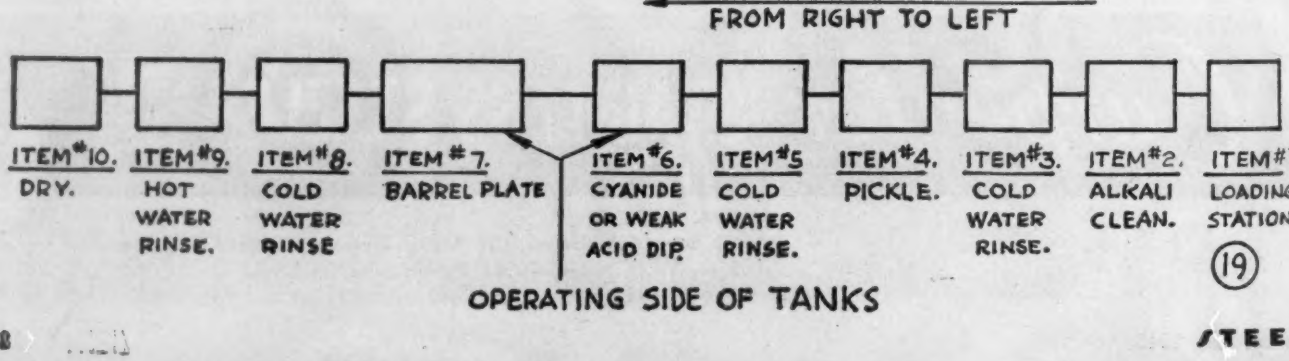


Fig. 18—Flow diagram for cyanide zinc plating operations

TABLE III
GENERAL EFFECTS IN PLATING TEST

Optimum composition	Uniform, brilliant surface over entire plate.
High ratio—NaCN/Zn	Low bright current density range, blistered deposits at high current densities; low cathode efficiency (gas evaluation excessive).
Low ratio NaCN/Zn (below 2.5)	High bright current density range, grey low current density range.
High caustic soda (above 8 oz/gal in excess corresponding to its ratio to zinc metal.)	About same as low NaCN/Zn ratio only more pronounced; crystalline appearance of deposit.
Low caustic soda	About same as high NaCN/Zn; excessive anode polarization.
High zinc (over 6.5 oz/gal)	High bright current density range.
Low zinc (below 4.0 oz/gal)	Poor cathode efficiency; gassing.
High molybdenum (above 1.0 oz/gal still, or 0.5 oz/gal barrel.)	Diminished rate of covering.
Low molybdenum	Brown-yellow plate, improved by bright dipping.
High "Zin-O-Lyte" brightener (Above 0.66 oz/gal)	Brightener remains suspended in bath; no adverse effect in plating test.
Low "Zin-O-Lyte" brightener	Low reflectivity; dull low current density range; diminished rate of covering, especially in barrel plating.
Impurities:	
Lead	Blistered deposits or dark deposits that are easily stained.
Copper	Copper darkens in HNO_3 bright dip, lead and cadmium dull deposit but do not darken in HNO_3.
Cadmium	

Fig. 19 — Flow of work in barrel plating operations. (Courtesy Udylite Corp.)


FLOW OF WORK
FROM RIGHT TO LEFT
ITEM #10. DRY.
ITEM #9. HOT WATER RINSE.
ITEM #8. COLD WATER RINSE
ITEM #7. BARREL PLATE
ITEM #6. CYANIDE OR WEAK ACID DIP.
ITEM #5 COLD WATER RINSE.
ITEM #4. PICKLE.
ITEM #3. COLD WATER RINSE.
ITEM #2. ALKALI CLEAN.
ITEM #1 LOADING STATION.
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PORTER—DIESEL-ELECTRIC *Switchers*

and now—

FINGER-TIP CONTROL

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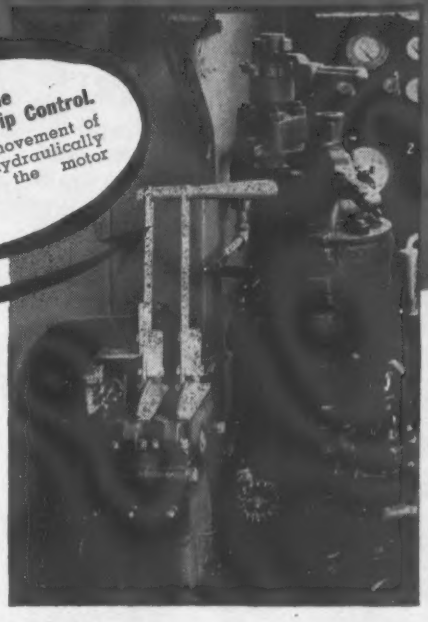
- ACCURATE
- INSTANTANEOUS

This is the PORTER Finger-Tip Control. The slightest movement of the throttle is hydraulically transmitted to the motor speed control.



To the progressive refinements constantly being incorporated in PORTER Diesel-Electric Switchers we now add FINGER-TIP CONTROL.

Utilizing the hydraulic principle of transmitting motion, PORTER'S Finger-Tip Control assures accurate synchronization of motors, and positive, instantaneous response to the slightest movement of the throttle lever in the cab. Finger-Tip Control eliminates troublesome rods, cables, pulleys, and turnbuckles, with their tendency to lost motion, back lash, and need for constant adjustment. Complete description and photographs on request.

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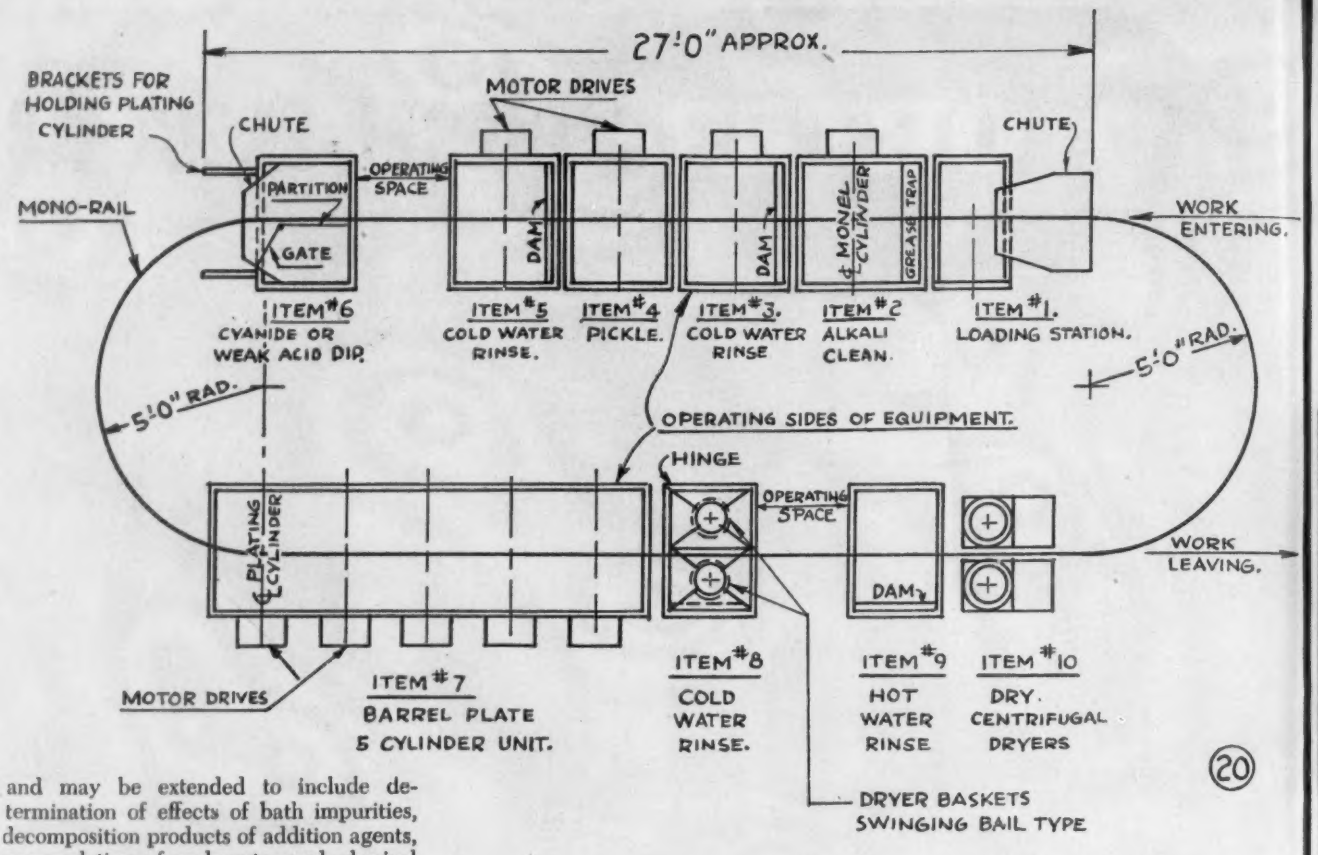

Fig. 20—Plan view of barrel plating equipment. (Courtesy Udylite Corp.)

and may be extended to include determination of effects of bath impurities, decomposition products of addition agents, accumulation of carbonates and physical variables such as temperature and pH.

In following the *procedure for making a plating test* in the Hull cell on a cyanide zinc solution, sample of bath is taken only after precautions which include bringing the solution to operating level stirring the entire plating bath to secure a representative portion, heating the sample to slightly above operating temperature, using a clean test cell and clean steel cathode plate (cold rolled about 20 gage) with the proper zinc anode. The zinc anode fills the cross section as shown in Fig. 14. In making the plating test, a total current of 3 amp should be used 2 to 3 min at the temperature of the plating tank bath.

In general, plating tests are particularly desirable in the control of "bright" zinc solutions. To illustrate the application of the Hull cell (Figs. 14-17) in the control of commercial "bright" zinc solutions the following resume has been taken from a paper presented by MacIntyre and Hull[45] before the 1943 Convention of American Electroplaters Society. Although these details are given for the Du Pont "Zin-O-Lyte"[46] bath the principal points may be extended to other "bright" zinc processes using different addition agents.

Anodes for Cyanide Type Baths

The two main types of anodes used in cyanide zinc plating are the ball type and the customary bar type anodes cast from slab zinc or suitable alloys.

High purity zinc anodes known as Special High Grade or High Grade[47] are recommended for the straight cyanide bath, since usually no addition agents are present and no provision is made for removing impurities from the bath. Use of impure anode material necessitates frequent purification. This also applies to the zinc-mercury process in which zinc alloyed with 0.5 to 1 per cent mercury, as previously mentioned may be used as anode material.

The "bright" zinc baths require high purity zinc such as Special High Grade or High Grade anodes free from objectional metals unless provision is made to purify the bath at frequent intervals to remove heavy metal impurities. It has been found that control of zinc metal content in cyanide zinc plating baths is somewhat difficult and presents a problem in "bright" zinc plating since variations in this bath constituent influences the current density range and efficiency of the "bright" zinc bath. Zinc passes into solution both electrochemically and by chemical attack and hence it usually tends to accumulate in the bath to an excessive degree. Magnesium or calcium[48] alloyed with zinc is effective in reducing anode efficiency to any predetermined value and for this purpose commercial zinc alloy anodes containing small amounts of magnesium are available for electroplating use. Aluminum when present in zinc anodes increases the rate of anode corrosion while mercury together with aluminum[49] alloyed with zinc tend to reduce the chemical attack and to improve anode corrosion characteristics.

In some instances where specific alloy anodes are not used, the zinc content is controlled by using from 25 to 50 per cent inert steel anodes together with pure zinc anodes. Difficulty may be experienced in this scheme however, due to the fact that zinc and iron in alkaline solu-

(*Please turn to Page* 146)

TABLE IV

Time-Temperature Table for Cyanide-Zinc Plating

Deposit Thickness in Inches	Deposit Wt. oz./sq. ft.	Time Required in Minutes for Deposits at Various Current Densities (90% Current Efficiency) Amperes/SF 10	15	20	25	30	35
0.0001	0.059	9.07	6.7	4.5	3.6	3.0	2.6
0.0002	0.118	18.1	13.4	9.0	7.2	6.0	5.4
0.0003	0.177	27.2	20.1	13.5	10.8	9.0	7.8
0.0004	0.236	36.2	26.8	18.0	14.4	12.0	10.4
0.0005	0.295	45.3	33.5	22.5	18.0	15.0	13.0
0.0006	0.354	54.4	40.2	27.0	21.6	18.0	15.6
0.0007	0.413	63.4	46.9	31.5	25.2	21.0	18.2
0.0008	0.472	72.5	53.6	36.0	28.8	24.0	20.8
0.0009	0.531	81.6	60.3	40.5	32.4	27.0	23.4
0.0010	0.590	90.7	67.3	45.0	36.0	30.0	26.0
0.0015	0.885	136.0	100.5	67.5	54.0	45.0	39.0
0.0020	1.180	181.4	134.0	90.0	72.0	60.0	52.0

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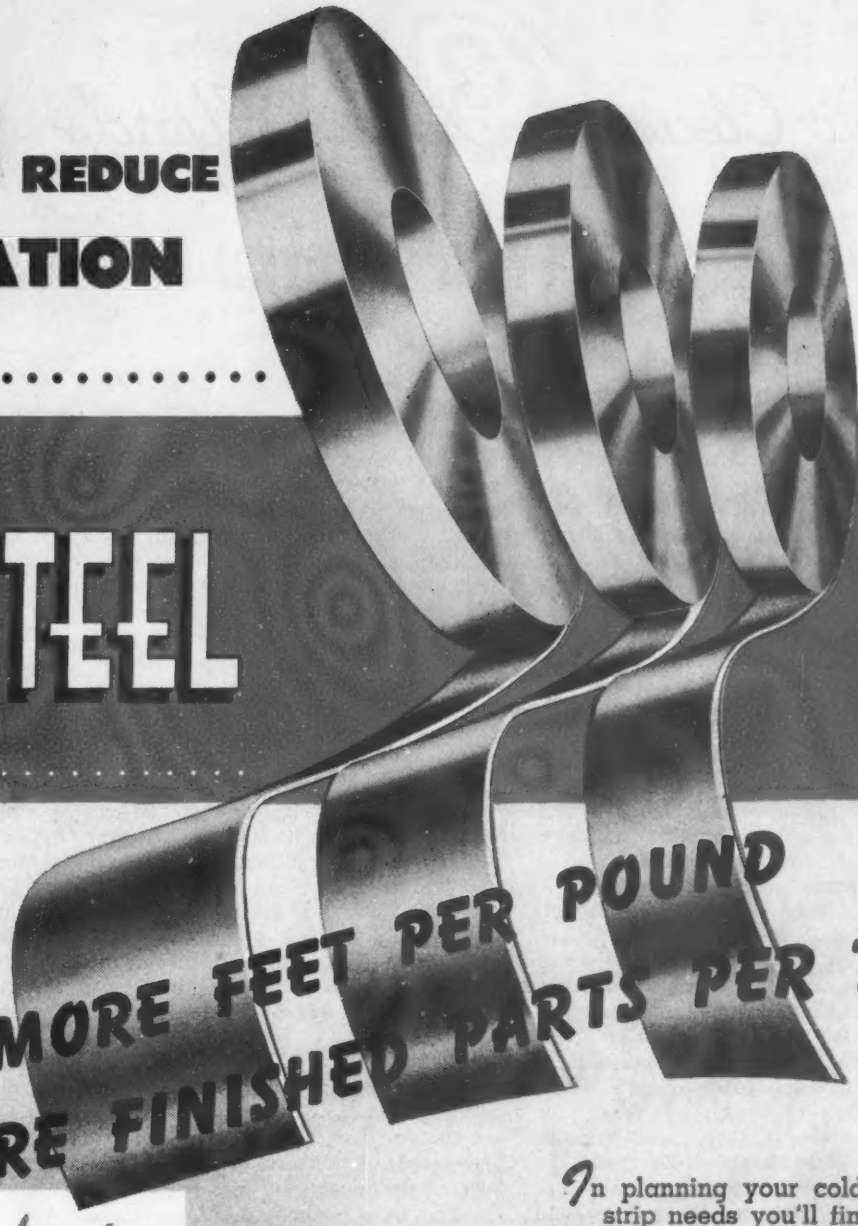

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New Cleaning Process Affords

BRIGHTER FINISH ON NAILS

NAILS now can be dewhiskered faster and cleaned to a brighter finish—with a saving in product and labor by a comparatively new process described by M. Ransohoff, president, Ransohoff Co., Cincinnati, at the opening technical session of the annual meeting of the Wire Association, La Salle Hotel, Chicago, October 15-18. Cleaning nails involves two important steps, the speaker pointed out. When nails come from the dies, they have a tight coating of lime and soap which must be removed. The second phase involves eliminating the whiskers left by the cutting knives which point the nail.

By the new method of cleaning and dewhiskering nails the amount of labor is reduced, the rate of operation increased and a superior product obtained.

When a batch of nails has been collected, it is charged into a drum equipped with a patented loading cone which prevents spillage. Here the nails are tumbled in a hot detergent solution which removes the lime and drawing compound. The solution is recirculated.

The whiskers are removed and screened out through blind screens during the cleaning cycle. Cleaning and burnishing take place in this drum since the nails are permitted to rub on each other while being lubricated by the detergent solution. A brighter nail thus is produced than is possible by the old method of sawdust tumbling, the speaker contended. Faster cleaning is also achieved since the cleaning solution softens the dirt.

Discharge Is Automatic

When the nails are cleaned and dewhiskered, the direction of the drum's rotation is reversed and the nails automatically pass out of the drum and into a second drum where they are dried and polished by tumbling in sawdust. Instead of sawdust some plants use cob meal since it wears longer. Cob meal while more expensive is more absorbent and has a better polishing action than the average run of sawdust, the speaker related. This second drum is heated to warm the sawdust and help in drying the nails. When the polishing action is complete, the drum is reversed and the nails and sawdust are emptied from the drums and onto a vibrating pan. Here the sawdust is sucked up into an exhauster and returned through a cyclone separator to the sawdust barrel. The nails continue onto the keg shaking pan and are dropped into the kegs ready for weighing and heading.

When cement coated nails are being processed sticking or holding back may be prevented by leaving them in the cement coating drum until perfectly dry. The machine will handle nails from ¼-in. brads to 60-penny; for smaller nails, the speaker recommended a smaller unit. In expressing his views on cost comparison, Mr. Ransohoff pointed out that the first cost is higher than tumbling mill practice. While maintenance per hour might run higher, he explained, the keg production per hour and the cost per keg will be lower. Cleaning time averages about 1 hr for two 40-keg batches. However, he stated, when carbide cutters are employed, the nails are much cleaner than the old style and therefore it might be possible to get below the two batches per hour. If no whiskers were present, he explained, it might be possible to complete the cleaning of a batch within 15 min.

Methods Still Unchanged

Kenneth B. Lewis, consulting wire mill engineer, Worcester, Mass., pointed out that we have nail mills almost dehumanized up to the kegging stage but beyond operations are practically unchanged from methods used years ago. It was suggested that a merry-go-round be installed at the kegging station in order to speed up production and facilitate handling and also that electric feeders made to shut off at any predetermined weight might be used effectively in kegging the product.

Wooden kegs are becoming more expensive and their use is being challenged, it was stated. One nail producer mentioned that plywood and fiber board container have been used but not with favor. Another producer employed a square container for packing nails but because these could not be rolled the mill was obliged to go back to the use of kegs.

F. R. Morral, metallurgist, American Cyanamid Co., Stamford, Conn., in speaking on "Molten Salt Baths for the Wire Industry" presented a pains taking review of salt bath applications as well as a bibliography of fused salt functions. In commenting on this paper, William Adam, Jr., Ajax Electric Co., Philadelphia, mentioned that a noteworthy improvement in furnace design has been the utilization of suitable refractory pots for many heat treatments previously carried out in metallic alloy pots. Ceramic-type salt containers have directly lengthened pot life in high-speed steel tool hardening installations (2200-2400° F) from three to six months service previously rendered by alloy-type pots to the two to four years operation now established as normal service before pot replacement is necessary.

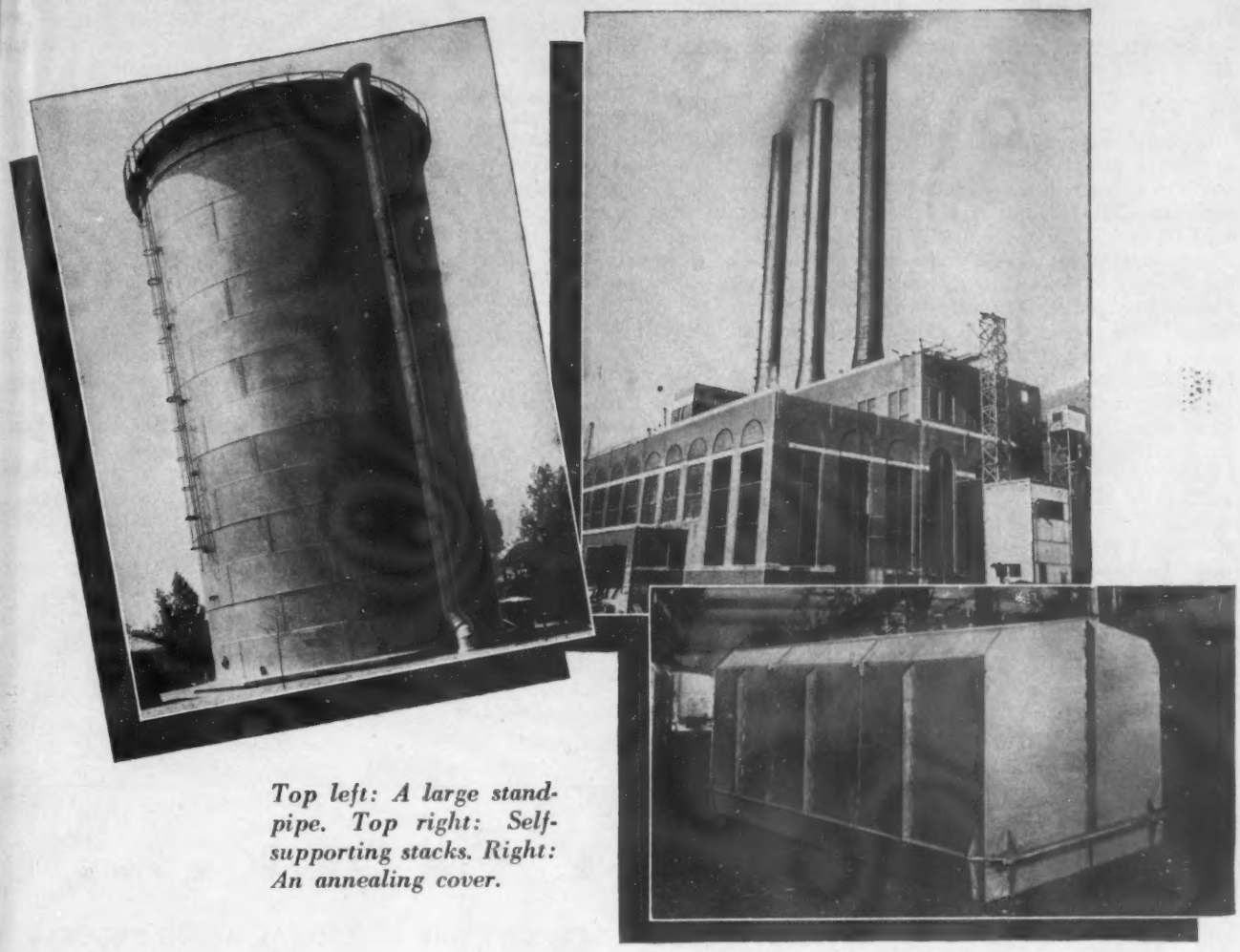
Use of refractory-type bath containers and better alloys for immersed-electrode heating of molten salts, the speaker explained, have made it economically feasible to build salt bath furnaces of any size or shape, as well as automatically conveyorizing the processing of work on a continuous basis.

Consequent commercial development of the salt bath process called "Isothermal Quenching" is perhaps the most heat treating advancement for peace time industrial application. This quench and temperature method has drastically lessened distortion and improved physical properties on a multitude of products such as gears, springs, cutlery, etc. Another new development , dependent upon the use of refractory type pots, is the application of salt baths for annealing stainless steels at temperature between 1650-2000°F. The inherently faster heating rate of salt baths coupled with their characteristic avoidance of scale formation, established new records for high production and low-annealing costs for all kinds of stainless steel.

Pickling Time Varies

In pickling stainless wire with hydroxide the reaction is complete in 15 to 20 min, according to comment from the floor, though the steel can be left in the solution for 24 hr without harm. The speaker advocated holding the temperature of the caustic solution at 700°F. When the solution is built up to a concentration of ½ to 2 per cent sodium hydroxide any grade of stainless, alloy, bi-metallic strip, stainless-clads, chrome-nickel steels, composite sheet etc. can be pickled with this solution. The cost on the average run of material ranges from 50c to $2 a ton. It was brought out also that to be economical the hydroxide pots should be operated 24 hr a day.

The question was raised concerning the use of borax as a coating material. One member stated that while it takes time to anneal in borax the situation is greatly helped by the addition of a small amount of fluorspar. Annealing with borax requires approximately 20 min.



Top left: A large standpipe. Top right: Self-supporting stacks. Right: An annealing cover.

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whereas by using borax and fluorspar the annealing time is reduced to 3 min. The solution should be maintained at the minimum temperature of about 1000°F.

Spring manufacturers find that they have to observe quality of production as well as efficiency in the operation of the machines. This fact was brought out by M. G. Talmadge in speaking on "Elastic Properties of Steel Wire". Wire drawn continuously is inclined to be more uniform and consistent, the speaker asserted. Spring wire is tested practically every inch of its length whereas rope wire is tested only at each end. Advancements are being made, he explained, in high-speed equipment and in labor saving devices both of which puts an extra burden on the wire. A question was raised regarding the origin of wild wire. In the opinion of one wiremaker the steel manufacturer has not kept abreast of fabrication. Price also is an important factor. If fabricators are willing to pay a premium for material they can effect large savings with the labor saving equipment of today.

The importance of the reduction of area in the evaluation of high-carbon steel wire for cold drawing purposes was stressed by B. L. McCarthy, chief metallurgist, and D. A. Sutch, metallurgist, Wickwire Spencer Steel Co., Buffalo. Mr. McCarthy in presenting the paper pointed out that the essential features of good heat treating practices common to the general heat treatment of steel apply in the patenting process in same manner as any other important heat-treating problem. The essential features are: Complete solution of intermetallic compounds, development of a uniform austenite, and controlled precipitation of the carbides.

Serves As An Indicator

The author pointed out that the reduction of area value can be used as a full indication of thorough patenting and the tensile values obtained by making the reduction of area tests, can have a definite significance. It was shown that the increase in grain size resulting from patenting and indicated by the reduction of area values may well influence the final ductility of the wire; it bears out the slip interference theory that coarse grains produce less interference to slip than fine grains.

Lead patenting because of the fact that the quench characteristics are different than in the case of air patenting, can be employed to produce any desired tensile providing this desired tensile is in excess of the normal tensile resulting from air patenting.

J. H. Loux, engineer, Salem Engineering Co., Salem, O., in speaking on "Annealing High-Carbon Wire Stock" stressed the importance of the surface condition of the wire before entering the furnace. It is impossible, he warned, to anneal free from decarb a wire covered with rusty water and he recommended giving the wire an alkali dip before placing it in the furnace. If this practice becomes standard, he stated, occasional losses of material would be prevented. However, the alkali dip may not be absolutely necessary.

Study is being given to the possibility of changing the spheroidizing cycle in some manner so as to reduce the overall cycle time, the author declared. Indications are that if the heating up time is reduced drastically the soaking time will have to be increased accordingly. In the author's opinion interesting alterations in the spheroidizing cycles for all types of steel will undoubtedly be developed within the next year.

(Continued next week)

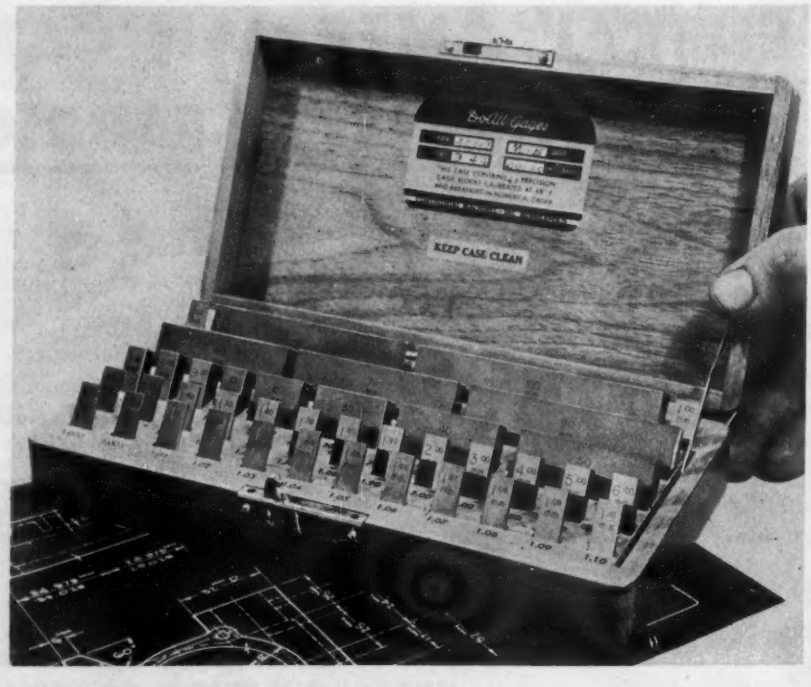
METRIC GAGE BLOCK....

POSSESSES UNUSUAL STABILITY DUE TO SPECIAL AGING PROCESS

SPECIAL aging process employing alternate heating and freezing to 120° below zero gives unusual stability to a recently introduced set of metric gage blocks designed to meet the needs of domestic and foreign manufacturers working in the metric system.

Blocks are made in two grades corresponding in accuracy to those of English measure. Standard methods of converting English measurements to metric can be eliminated entirely with the wide range of measuring combinations available. Blocks also may be used to make up English system combinations. The convenience of such a dual-purpose set may be most appreciated by those manufacturers who hope to retain some part of the foreign market created by World War II.

Shown here is a set consisting of 38 blocks, plus two wear blocks (of tungsten carbide in inspection grade) and is capable of producing over 100,000 combinations ranging from 1.01 to 100 mm. Millimeters are in increments of 0.01-mm. A special 1.005-mm block in the set makes possible special combinations for closer tolerances where needed. Inspection quality is guaranteed accurate to within plus or minus 0.0001-mm, and working quality to within plus or minus 0.0002-mm.



Blocks are made from high carbon chromium steel, and are said to be guaranteed by the maker, Continental Machines Inc., Minneapolis, to exceed a hardness of 65 rockwell C. A fine surface finish (4/10-microinch in inspection grade) affords excellent wearing qualities. The 40-piece set is upended in its case for convenience in handling.

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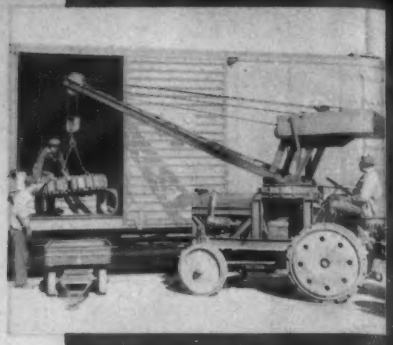

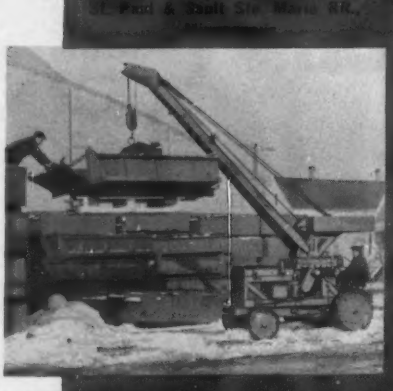

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(*Continued from Page* 101)

practice is illustrated by the following example:

Suppose in examining the sample, one inclusion is found whose length (actual) is 0.015-in. and whose width (actual) is 0.001-in. which falls in the width classification No. 2. Final classification of the inclusion is calculated as follows: Length 0.015-in. multiplied by the width classification (2) equals 0.03 or weight classification C. This is one C-type inclusion.

The individuality of inclusions renders it impossible to establish a definite technique for inclusion counting. Generally speaking, however, the following points may be said to apply:

(1) Length of an inclusion is measured to the nearest 0.05-mm.

(2) Inclusions which are less than 0.005-in. in length are not measured unless their width is over 0.0005-in.

(3) The width of the inclusion shall be considered as the maximum width.

(4) A discontinuous nonmetallic segregate is considered as one inclusion when it is in a continuous line, and the various individual segregates are closely enough associated to be in effect one inclusion.

An examination of about 100 bars of 3⅝ in. round steel revealed no relation between inclusion count and die life. The type of macrostructure (Groups 1, 2, 3, or 4) was no indicator of the inclusion content of the bars.

In order to attempt to find these correlations the bars were classified according to inclusion content as follows:

Group 1—A Type only
Group 2—A & B Type only
Group 3—A, B & C Type only
Group 4—A, B, C, D, E, F, G & H Type

Three specimens were examined representing both ends and the center location of each bar.

The distribution and incidence of the nonmetallic inclusions in 65 bars of steel utilizing 82 micro-specimens are shown in Fig. 37.

Although no correlation between inclusion count and die life was recognized, it is reasonable to assume that the presence of an E, F, G & H type inclusion in a critical area would cause early failure of a die. From a consumer's standpoint specifications for limitation of nonmetallic inclusions should eliminate the presence of E, F, G or H type inclusions and restrict the number of A, B, C & D type. Of the 82 specimens examined 79 (96 per cent) contained B type inclusions, 25 (30 per cent) contained C type, 14 contained D type and 13 contained E, F, G or H type. However, if a breakdown is made on the basis of carbon and alloy steel, the carbon steel shows that out of 38 specimens examined 8 (21 per cent) contain B type inclusions, 2 (less than 1 per cent) contained C type, 2 contained D type and none contained E, F, G or H type. In other words, the carbon steel contained a lesser number of inclusions than the alloy steel.

Fig. 37—Distribution of nonmetallic inclusions in 95 bars of cold-heading die steel

Fig. 36 — Micrograph of 1.20 per cent carbon steel slowly cooled from 1700°F to 1000°F at rate of 100-200°F per hour. Etched in Nital; 2000X

Annealed Microstructure: The user of tool steel in the majority of cases orders his material in the annealed condition suitable for machining. Some prefer a complete degree of spheroidization, others have a preference for the presence of pearlite in varying amounts. Theoretically, when a complete degree of spheroidization is specified it is preferable that the carbide particles be relatively small and uniformly distributed so that the steel after heat treatment has a uniform microstructure.

Figs. 20-31 inclusive illustrate various types of annealed structures. Microstructures at 1000 diameters designated as Type A are completely spheroidized structures. They are numbered from 21 to 24 in order of increasing carbide particle size. Ordinarily, the particle size designated A-24 would not be acceptable.

The Type B structures are similar to Type A to the extent that they do not contain pearlite and differ with respect to the shape of the carbide particles, these particles being elongated in shape. B-28 would be unacceptable inasmuch as the particles are large and are remains of carbide network.

Type C structures contain increasing amounts of pearlite, C-32 being unacceptable because of the carbide network.

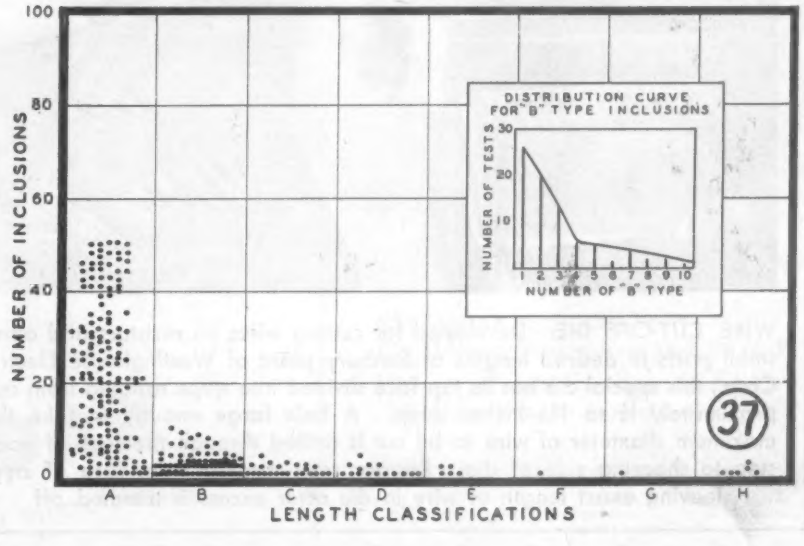
Brinell hardness is often used to check the annealing of tool steel. Within certain limits this is a useful test, however, it does not take the place of a microscopic test for it gives but the faintest clue to the carbide particle size and distribution. Brinell hardness of the annealed steel will range from 149 to 223.

TABLE I
WIDTH CLASSIFICATION (f)

Number (f)	Width (Inches) Over	Inclusive
1	.0	.0005
2	.0005	.001
3	.001	up

TABLE II
WEIGHT CLASSIFICATION (f x L)

Group No.	f x L Over	Inclusive	Group No.	f x L Over	Inclusive
A	.005	.01	E	.04	.05
B	.01	.02	F	.05	.06
C	.02	.03	G	.06	.07
D	.03	.04	H	.07	.08



The hardnesses on the low side would represent completely spheroidized microstructures with the lowest hardnesses perhaps representing structures with large spheroidal carbide particles. The hardness readings above 196 brinell up to 223 would represent microstructures containing pearlite but with no information leading toward the detection of large carbide network.

Now, as to the effect of annealed structure on the final structure of the heat treated steel, a steel containing from 1.10 to 1.20 per cent carbon when slowly cooled from 1700°F will have a structure similar to Fig. 36, consisting of pearlite and carbide network. The retention of this carbide network after hardening and consequently nonuniform structure depends to a great extent on the hardening temperature. Figs. 32-35 (inclusive) illustrate the effect of the hardening temperature on the retention of carbide network in a 1 per cent carbon steel.

It is noted that the specimen hardened from 1600°F attained complete solution of the carbide network. However, if the steel contains carbide forming alloys such as chromium, vanadium or molybdenum, carbide network would be more difficult to remove and the microstructure of the finished die would be nonuniform even when hardened from 1600°F. Of course, it is not always desirable to harden from a temperature as high as 1600°F so that an annealed structure consisting of small, well distributed carbide particles would be the most desirable structural condition for all these die steels.

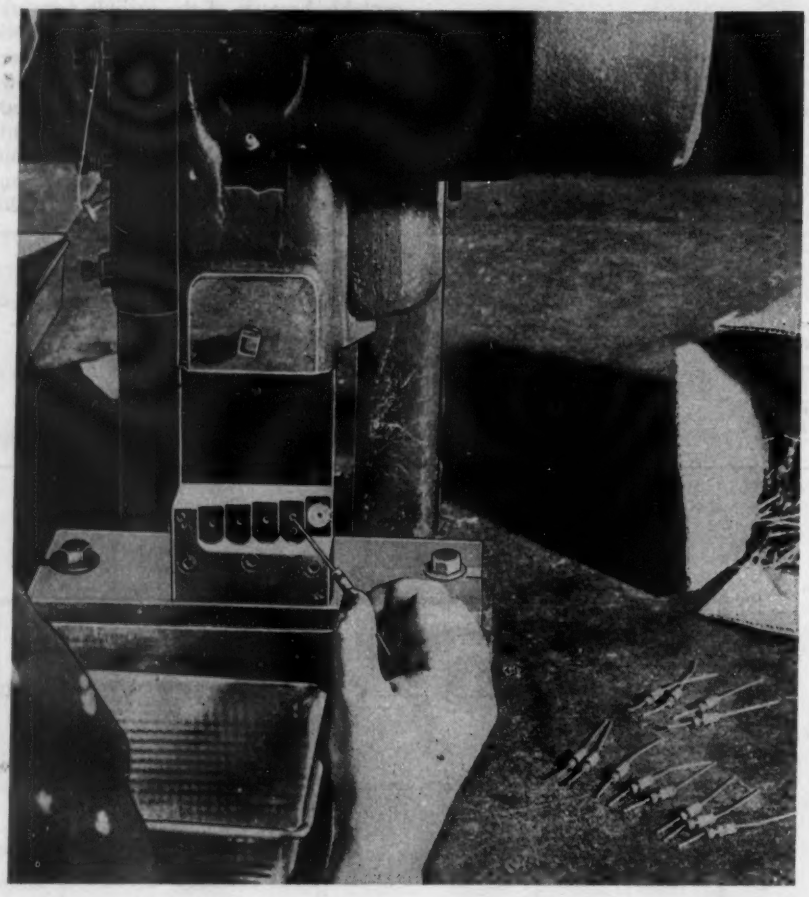
In this article three conditions which affect the quality of cold heading die steel have been discussed.

Correlation Attempted

Correlation has been attempted between macrostructure and die life and inclusion count and die life. Only in the case of macrostructure was a correlation successful. This does not imply that there is no correlation of inclusion count to die life. As a matter of fact correlation of any quality or condition of steel to die life is difficult to obtain due to the many other variables involved such as, the condition of the stock being formed, the die setup, and the operation of the machines etc.

Because of the difficulties of controlling variables other than the one being studied, the performance of die steels is at the present time of an impressionistic nature rather than one of mathematical exactness at least with respect to the quality factors which have been discussed here.

This should not detract users from setting up definite quality standards of the types that are shown here for at least they act as controls for these variables and allow for a more exact study of other factors concerned with die life. They should, however, be reasonable in relation to the capabilities of the steel manufacturers.



WIRE CUT-OFF DIE: Developed for cutting wires on resistors and other small parts to desired lengths at Sunbury plant of Westinghouse Electric Corp., this special die has its top face divided into steps ranging from approximately ½ to 1⅛ inches deep. A hole large enough to take the maximum diameter of wire to be cut is drilled through the face of each step to shearing side of die. Resistor rests against front face of step, leaving exact length of wire in die after excess is trimmed off

Automatic Control

(*Concluded from Page* 108)

eral different cuts, and also for both roughing and finishing cuts. This reduces to lowest terms the overall number of tools required on multi-diameter work.

The only point where automatic control is limited as compared to manual control is in regard to the number of possible speed changes. The machine ordinarily has 20, of which any six can be attained automatically. However, the range of six is more than sufficient for any ordinary job.

Each head has an independent feed unit, called a field bracket, giving 16 feeds ranging in geometrical progression from 0.0006 to 0.125-in. per revolution of work. Four directions of feed—up, down, in and out—are provided by each bracket, and each at any one of the 16 rates. Power traverse—that is, high speed traverse—is provided in all directions, through conical friction clutches. Hand motion is through hand wheels which disengage automatically when power is applied. Each hand wheel has micrometer dials and observation stops.

All clutches and sliding gears in the feed brackets are positioned by small inbuilt hydraulic cylinders which in turn are operated by Man-Au-Trol. For manual operation, levers on the control units provide for admission of oil to the cylinders to bring about the desired functions. When automatic control is switched on, these levers become inoperative.

Automatic machinery invariably is fascinating to watch in operation. This machine impressed the editorial delegation to an unusual degree. Despite the large size of the machine it "clicked off" its cycle with machine-gun speed and efficiency. Some idea of this speed and efficiency is given by the fact that the demonstration piece, requiring at least 20 min under capable manual operation, was machined in 5 min and 45 sec when Man-Au-Trol took over. And that performance could be repeated, 24 hours a day, 7 days a week.

—o—

F. H. McGraw & Co., engineers and constructors, has issued an illustrated publication entitled "Plans and Projects," describing some of the company's current operations. Copies may be obtained on request to the office at 51 East 42nd street, New York 17.

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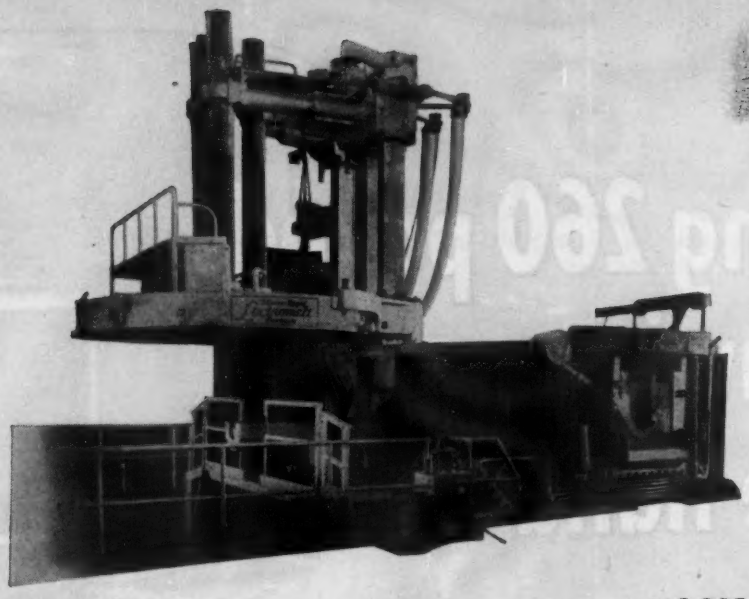

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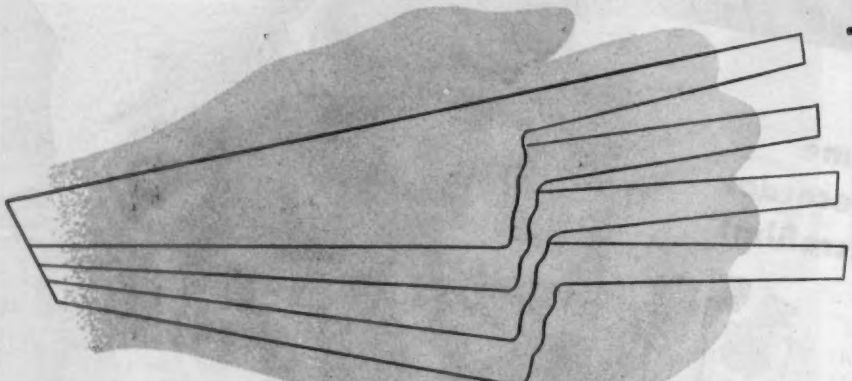

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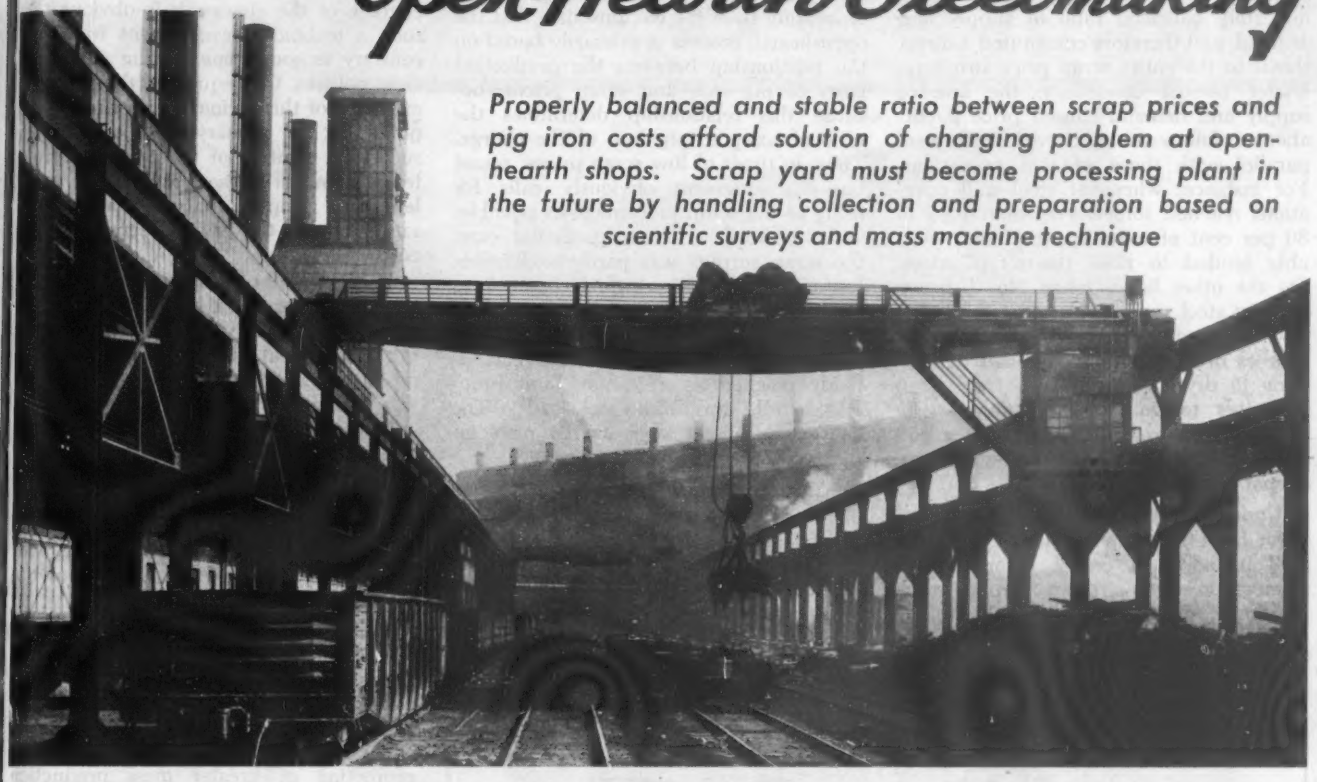
Mechanical Phase of Open-Hearth Steelmaking

Properly balanced and stable ratio between scrap prices and pig iron costs afford solution of charging problem at open-hearth shops. Scrap yard must become processing plant in the future by handling collection and preparation based on scientific surveys and mass machine technique



Open-hearth stockyards will play an important part in the immediate future

By F. W. SUNDBLAD
Assistant Open-Hearth Superintendent
Great Lakes Steel Corp.
Detroit

CERTAIN economic conditions which constitute the very foundation of the open-hearth process exercise today a far greater influence upon the development of the mechanical phase of steelmaking than they did in the past. Technological effects of the fluctuations of the price of scrap relative to the production costs of pig iron are still of great importance. And because this economic relationship lies outside the jurisdiction of the engineering mind, any major change of the production technique affecting the basic trend of the mechanical aspect must be calculated on the basis of an unknown quantity, with the result that the effort, however sound from a technical standpoint, may be proved unsound in the light of this relationship. This unique situation is brought to the surface when attempting to find a workable solution of the present scrap problems involving a scrap supply of well over half a billion tons in a world market which now has lost its two best prewar customers—Germany and Japan.

Thus, while the engineering mind is able to design new open-hearth charging systems based on new principles in order to take advantage of this enormous scrap supply, the question arises: Would it be compatible with sound technological and economic policies to install a charging system favoring high scrap percentage and low scrap prices, when the very efficiency of the system would create greater demand and higher scrap prices under present market rules, which in turn would automatically lower the competitive strength of the new system versus older methods?

Fundamental changes in the American scrap market in the 1920-1940 period, were brought about by the rise of the automotive and container industries and a number of similar consumers of semi-fabricated steel, and by the decline of the older major industries consuming finished steel in the form of rails, pipes, structural shapes, etc. So greatly did this change in the steel market affect the potential scrap supply of the nation that it produced two additional major sources of steel scrap. In the old days, when the industries of the latter group took the lion's share of the steel production, the steel did not come back to the scrap pile until after 20 to 40 or more years, but in the 1920-1940 period, when the biggest part of the steel production left the mill in semifinished form, whether it was for the automotive, container, refrigerator, furniture, electrical appliance or other similar industries, approximately 10 per cent became scrap immediately in the finishing processes, while the life span of the finished product was shortened to 1 to 20 years.

In other words, the country's steel scrap supply was filled since 1920 through four distinctly different inlets:

1. Scrap produced in the steel mill.
2. Scrap produced in the finishing process outside the mill.
3. Short-cycle steel scrap (automotive, etc.).
4. Long-cycle steel scrap (rail, pipes, etc.).

Altogether, these sources of potential steel scrap produced in an average year of the last decade—say 1936—between 38 and 40 million gross tons. If we deduct the scrap produced in the steel mill, or 15,685,415 gross tons, we find the annual supply reached between 22 and 24 million. In that year (1936) the steel manufacturing units in the United States purchased 12,319,386 gross tons of domestic scrap (the imported amount was insignificant). Consequently, the country produced a surplus of well over 10,000,000 gross tons of steel scrap.

How to dispose of this tremendous annual surplus became the subject of most intensive study, not only by the scrap and steel industries, but also from a na-

From an article in the August issue of the *Iron and Steel Engineer*.

tional economy standpoint. As a result, we can register three widely separate lines of reasoning during this period of readjustment which have an all-important bearing upon our subject.

From the scrap industry's viewpoint, this scrap surplus created an abnormal economic condition which disturbed the delicately balanced ratio of supply and demand, and therefore constituted a direct threat to the entire scrap price structure. Under normal conditions, the law of supply and demand caused price fluctuations to follow certain curves which were parallel with those of mill operations. For instance, whenever steel mill operations reached somewhere around 75 to 80 per cent of capacity, this law inevitably tended to raise the scrap prices. On the other hand, when No. 1 heavy melting steel scrap price went down below the production cost of pig iron, the sources of supply generally had a tendency to dry up. It did not pay scrap collectors to gather scrap unless they could make a reasonable profit over and above transportation costs, segregation, preparation and loading.

Under these circumstances, the logical move from the scrap industry's standpoint was to adopt a policy favoring total elimination of the scrap surplus. Accordingly, we exported over 20 million gross tons of the better grades of steel scrap from 1933 to 1940, and buried the lower grades, or approximately 70 million gross tons, in the dumping grounds of every city, town, village and hamlet.

From an engineering viewpoint, the scrap surplus presented a problem unique in the respect that its technical potentialities, however great and far-reaching, were hopelessly overbalanced by factors emanating from the circumstance that the open-hearth process is primarily based on the relationship between the production costs of pig iron and scrap prices, because this relationship determines the ratio of scrap to pig iron of the charge. Thus, in times of low scrap prices, sound business judgment obviously calls for using as big scrap percentage as possible, and vice-versa. In our particular case, the scrap surplus was partly responsible for a scrap situation which favored as great a scrap percentage of the charge as possible. The question then arose: Could a charging system which had already reached its efficiency limit properly handle this additional load? The consensus among open-hearth men indicated a negative answer.

Aside from the purely technological effects of new approaches to the charging problem, this development has also brought out the economic aspects of advanced charging technique. We find that, although one of the principal objectives of greater mass production technique in charging is to encourage the use of scrap, it stands to reason that it would create a greater demand for scrap, which in turn, according to the law of supply and demand, would raise the price of this material. When this price would reach a point high enough above the production costs of pig iron as to make it more profitable to use a lower scrap percentage of the charge, it is obvious that such a technical development would be contrary to sound engineering and economic policies. Consequently, the potential existence of this vicious circle stresses the point that the primary prerequisite for a successful solution of the charging problem, as well as of the scrap surplus problem, is a properly balanced and stable ratio between the price of scrap and the costs of pig iron.

In the light of this situation, a new economic school of thought attacked this problem from a vastly different angle. It argued that, however prominent a position steel scrap occupied in the prewar period, its future role would become still more vital to the nation due to the alarming rate at which high-grade iron ore deposits are dwindling. Therefore this problem is a matter of national concern and consciousness, and must become part of a national program dealing with the development and preservation of national assets.

Technique Must Be Altered

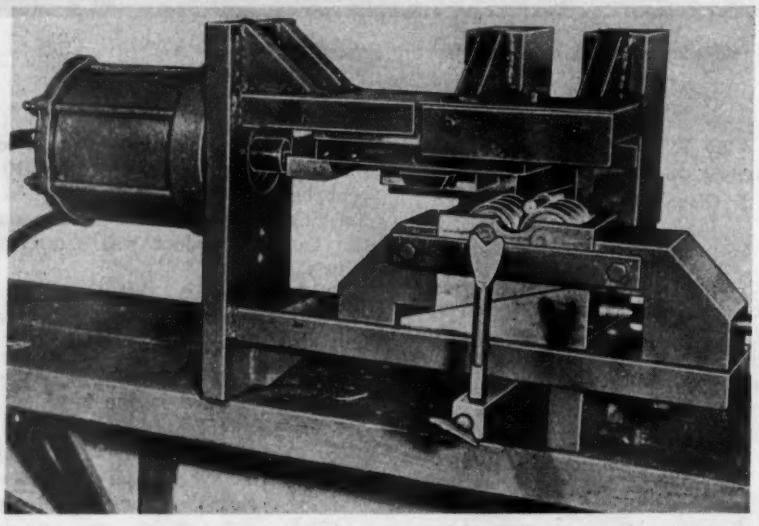
And to bring about a relationship between the price of scrap and the production costs of pig iron which is sound enough and stable enough to induce promotion of greater mass production technique in charging and melting periods, the economic and technical aspects of the scrap problem must be altered to meet modern standards. In short, from an economic standpoint, the profit motive must be subordinated to the production motive to such an extent as to totally eliminate speculative influences upon the rise and fall of this price. From a technical standpoint, the scrap yard must become a modern processing plant handling collection and preparation on the basis of scientific surveys and mass machine technique.

It is to be observed that this reasoning, however idealistic it appeared 15 or 20 years ago, is now in the process of being materialized thanks to war time economic conditions. We find that the United States is rapidly becoming scrap conscious. Scrap collection has improved to a point where it is beginning to meet modern standards. National scientific surveys determining the supply and demand of scrap constitute the basis *for* scrap collection and distribution. Container scrap is no longer wasted, but is scientifically treated in order to retrieve the tin as well as making it useful from a scrap standpoint.

The present scrap problem centers on these points:

First: That an overwhelming degree of the total world finished steel production, the annual amount of which has been between 80 and 100 million tons since 1939, will constitute potential steel

(*Please turn to Page* 148)



AIR GROOVING FIXTURE

REDUCES MACHINING TIME

AN air actuated fixture developed to coin oil grooves in shaft journals has considerably reduced machining time and improved the quality of the work. The fixture, constructed at Westinghouse Electric Corp., Lima, O., consists of a heavy duty frame in which is mounted, side by side, a pair of heavy duty roller bearings having a 1¾-in. diameter by 2-in. face. These bearings act as bedding points for the shaft while the groove is being formed. A die, mounted on a slide above the bearings, has an angular rib on its face to correspond to the journal diameter and pitch. It is actuated by an air cylinder having a 4 in. bore and a 3 in. stroke.

This device is so constructed that diameters from ½ to 1 in. can be run. Adjustment for diameter and depth of groove is accomplished by varying the height of the bearings through the wedge set-up.

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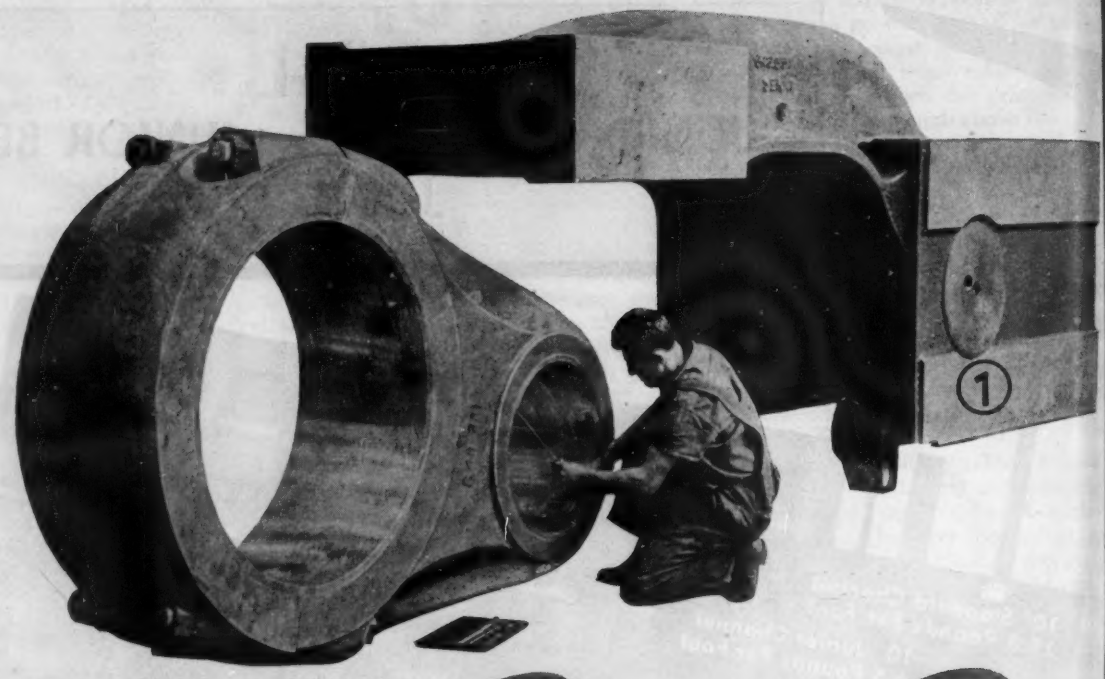
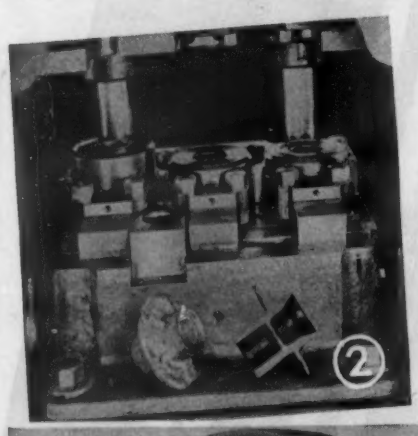


Fig. 1 — Long heading ram and heavy pitman of the press

PRECISION *Forging Press*



Longer die life, considerable increases in production afforded by new high-speed forging press

LARGE precision forgings, held to close dimensions with freedom from draft and a minimum of flash, are produced with marked savings in material and machining on a new giant of forging presses. Weighing 800,000 lb, it operates at a speed of 50 strokes per minute and is capable of producing, at one stroke in each die impression, the size of work normally handled on an 8000-lb steam hammer. Longer die life and considerable increases in production are anticipated for makers of such products as large wheel hubs, gear blanks, pipe flanges, crankshafts, connecting rods, side bar links and bearing races.

Features of the Maxipres No. 7½, made by National Machinery Co., Tiffin, O., and shown in Fig. 3 include a short, compact, preloaded bed frame; full eccentric alloy steel main shaft; special analysis high tensile bronze adjustable main bearings; long over-arm piloted ram (Fig. 1); and an air-cooled pneumatic friction clutch. In addition, there is an absolute minimum of joints between the main shaft and the dies. Vertical die adjustment is obtained by means of a double wedge which prevents floating of the bottom die, thus decreasing contact time between the hot stock and the dies. Contact time is further required by positive, quick acting knockouts.

Flow of metal into dies is not by impact. It occurs uniformly throughout the height of the blank, and movement of metal into the die cavity is continuous, with pressure gradually increasing as the ram nears the bottom of its stroke. There is a maximum ot metal flow into the die without splashing of the hot stock. Thus the forging is well filled and contains a minimum of flash. As

(*Please turn to Page* 149)

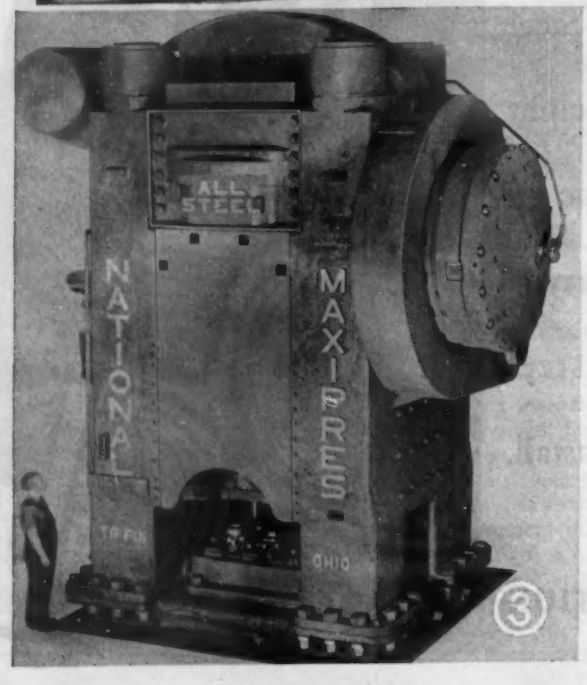
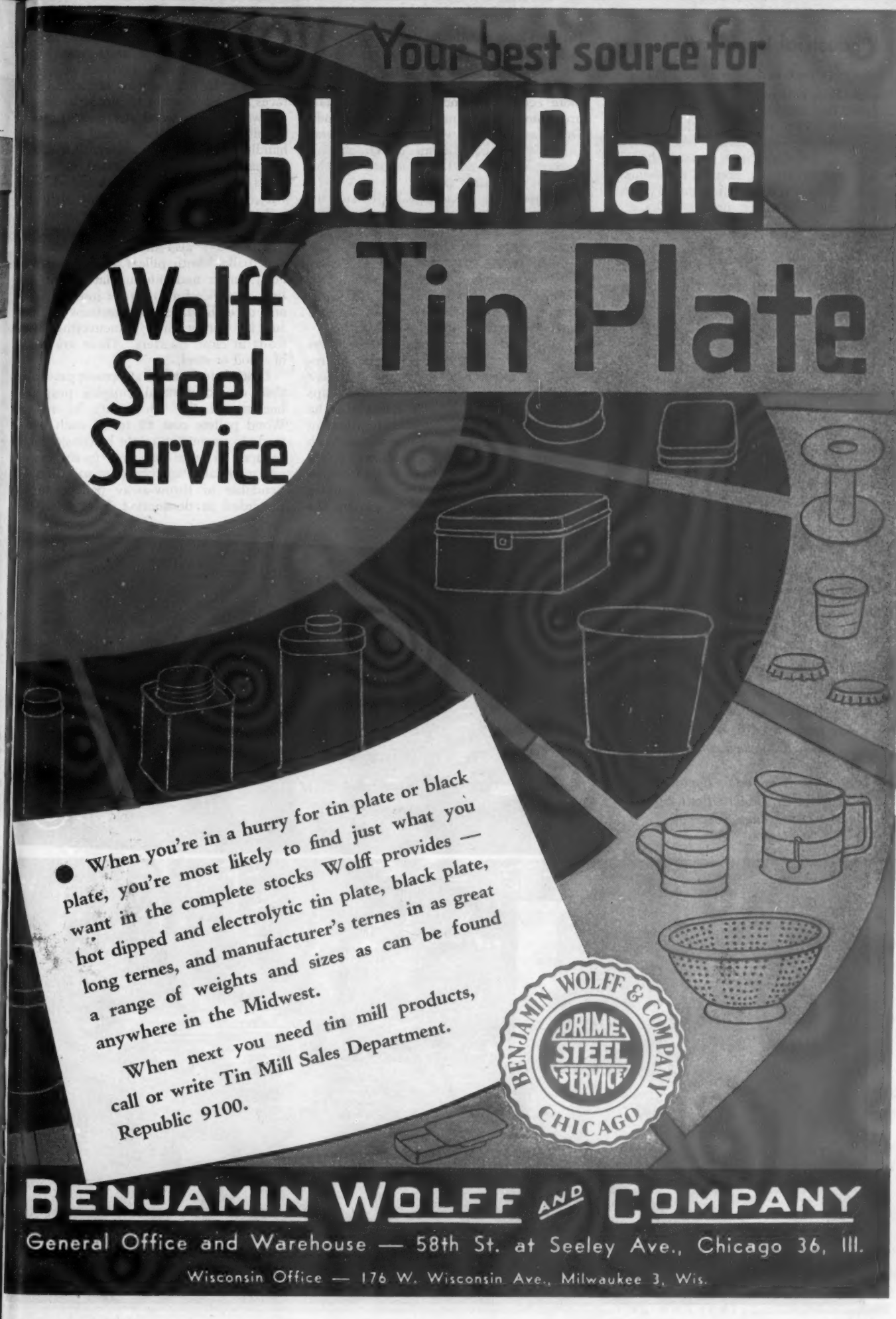


Fig. 2—Typical forging die. Truck hub forgings 9⅝-in. in diameter are produced in four blows on one heat. Note that sectioned forging is almost entirely pierced, reducing weight to minimum

Fig. 3—"Above floor line" view of high speed forging press. Die may be seen at center, bottom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"Industrial Logistics"

(*Continued from Page* 105)

and Ohio, it is necessary to transfer loads from one road-truck line to another at Buffalo. This was a "bottleneck" until one operator with one power industrial truck accomplished in 9 *minutes* the work which formerly required 9 *manhours* of manual labor! In another industry, seven men and one truck now are doing six times the work formerly done without a truck.

Simple comparisons make advantages obvious. For example, a truck can pick up a 2000 or 3000-lb load on a pallet or skid, transport it some distance and set it down in about the time an average man will take to move 100 lb in a wheelbarrow or handtruck that distance. The power truck elevates and tiers the load 10 to 15 ft in a few minutes. How long would it take one man or a group of men to do the same work? Apply the comparisons to the character of the loads you have to handle.

There are other considerations: Components of some loads are expensive, and considerably more time is required to handle them manually to guard against damage. There are fragile loads and dangerous loads which multiply the risk of accident. The margin of safety in practically every instance is in favor of trucks. They are at their best when they handle loads measured in tons, of the type which strain muscles and exhaust men.

The Long Shoremen's Union on the Pacific Coast petitioned for more trucks to load and unload vessels. Which raises the question: Will returning soldiers want to do hard manual labor when better and more economical methods of equipment are known to them and are at hand? One Navy officer, who was instrumental in devising the Bureau of Ordnance's system, was asked that question and he replied: "Certainly not!"

Competitive Advantages? Reducing costs and contributing to the speed of production are main ones. But with the increase in the number of trucks, an additional factor has appeared. This pertains to the competitive advantage a manufacturer has in shipping his products so that purchasers, too, can use trucks in handling them.

The interests of various manufacturers and consumers are interlocking in this respect. A buyer who is equipped to save money will prefer the supplier who ships materials to him in such a way that he may use his power handling equipment in unloading and storing operations. Such preference is already being shown; it will increase when buyers have wider latitude.

What About Pallets? Several million pallets are known to be in use by the government and millions more are in manufacturing plants and warehouses. The Navy first standardized on wood pallets 48 x 48 in., the two horizontal surfaces spaced about 4 in. apart by means of two or three wood stringers. Later it developed new types of steel pallets for handling "live" shells safely. A number of patents have been issued in recent years on steel pallets, fabricated with wire, rods, light shapes and strip by welding. Some companies now are manufacturing large numbers of these pallets.

The Navy also developed an "eight-way pallet" with pillars at the four corners, center and intermediate points, so that a truck's fork may be inserted from any of eight different directions — useful in tiering and maneuvering with loads in close quarters. These are made of wood or steel.

Cost of steel pallets at present precludes their use for general shipping purposes, because of the uncertainty of return. Wood pallets cost $2 to $3 each when made in quantities; might be considerably reduced in large lots close to sources of raw material. Paperboard, or so-called expendable or throw-away pallets, to be discarded at destination, have been de-

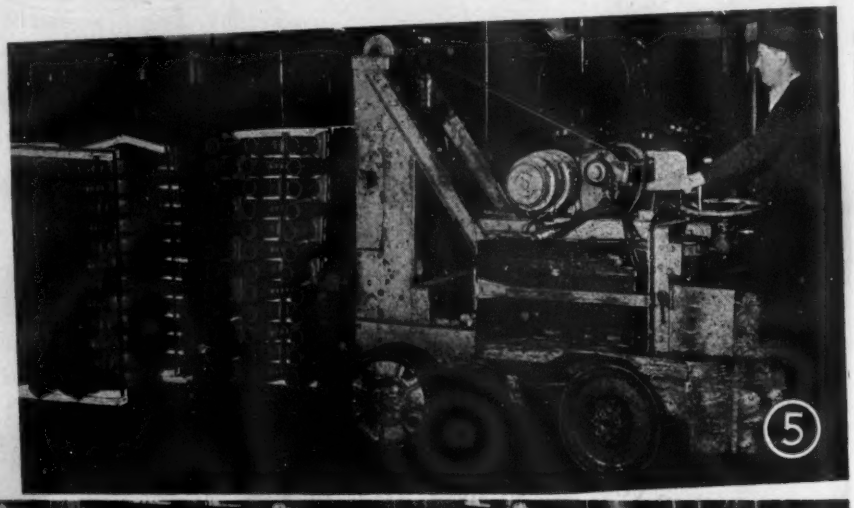


Fig. 5—Axle housings steel strapped together and mounted on cleats are transported as a unit by means of fork trucks as shown here

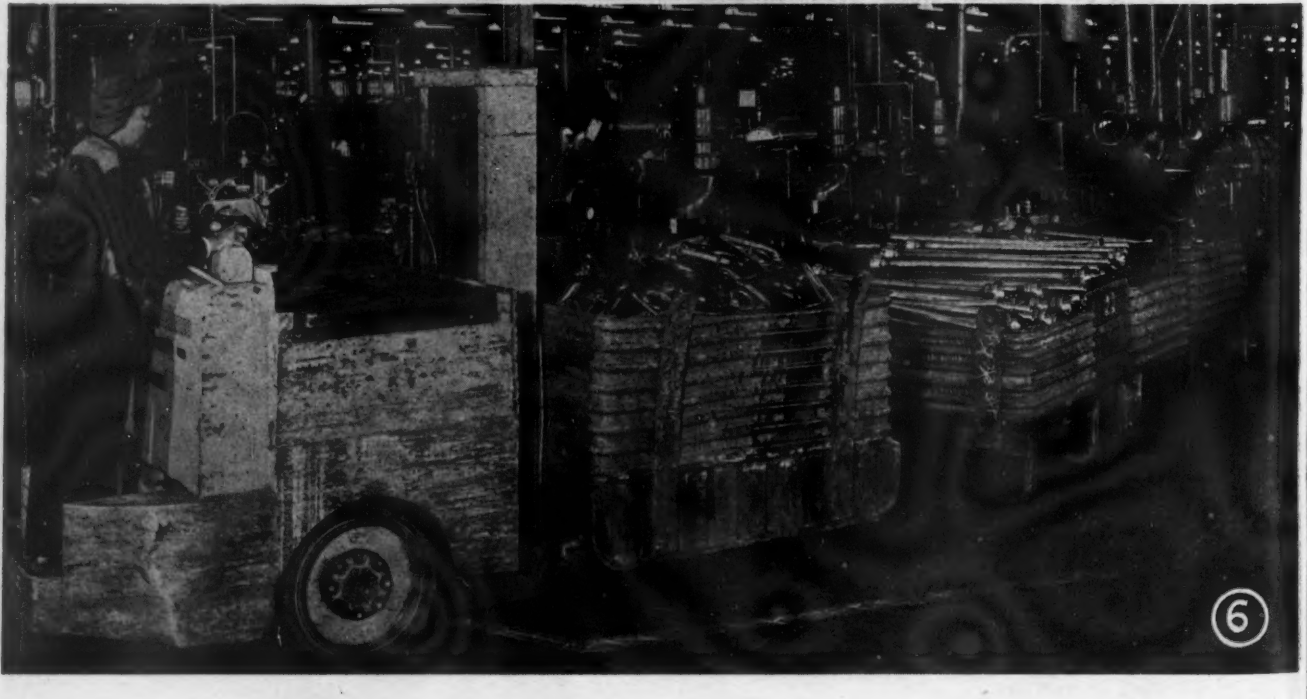
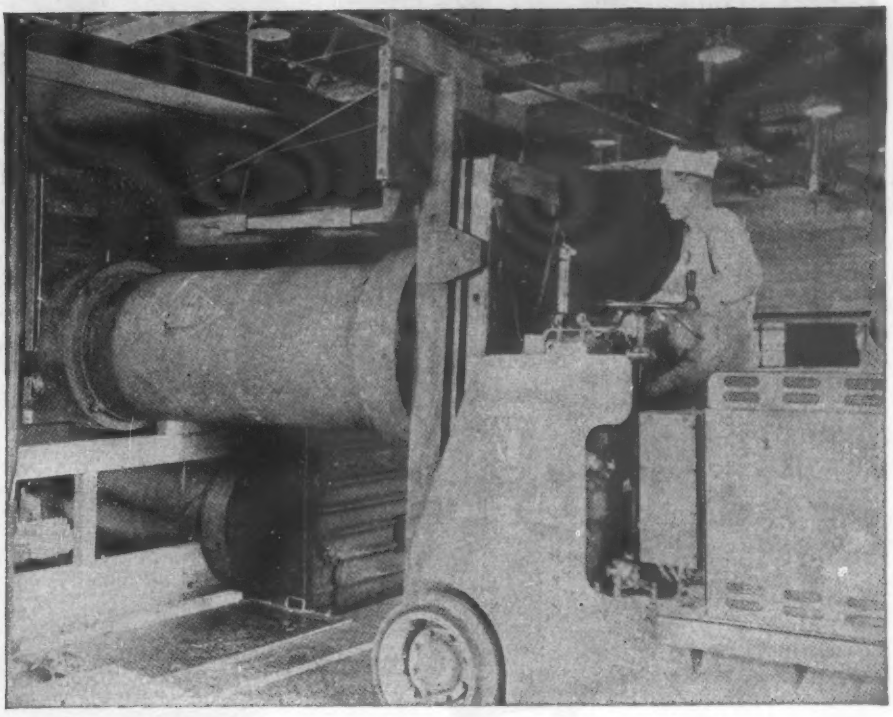


Fig. 6—A materials handling "station" in Chevrolet's Pratt & Whitney engine division

Use Battery Trucks for SAFE handling



...Alkaline Batteries for Most Dependable Power

One of the outstanding advantages of battery industrial trucks for material handling is their inherent safety. Because they give off no fumes and are practically free from fire hazards, they can be used without restriction in almost any kind of plant. They can even be provided with spark-enclosed construction for safe operation in hazardous locations. Many are operating successfully in ordnance depots.

With batteries exchanged two or three times per 24-hour day, the truck is kept continuously supplied with power. While one battery operates the truck, another is being charged. Except for the few minutes needed to change batteries, the truck need not stop for servicing its power unit. Its electric motor drives have a minimum of wearing parts; are inherently simple and trouble-free. The truck starts instantly; accelerates smoothly; operates quietly; consumes no power during stops. Not only does it make efficient use of power but the current used for battery charging is the lowest-cost power available.

Thus the battery truck is an inherently dependable, safe and economical handling unit, especially when powered by Edison Alkaline Batteries. With steel cell construction, a solution that is a natural preservative of steel and a fool-proof principle of operation, they are the most durable, longest-lived and most trouble-free of all batteries. Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, N. J. In Canada: International Equipment Company, Limited, Montreal and Toronto.

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And as for *low cost:* Two wheel fixtures keep the tappets turning into the inductor and quench. Operators simply load the wheels. The tappets drop out at the bottom at a *cost-cutting rate of 5400 per hour*.

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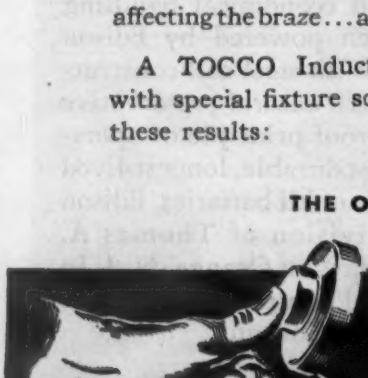

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signed and patented. Costs are as low as 35 cents each. Look for them to come into extensive use in shipping of light but bulky loads in food and drug industries.

The ideal pallet for universal industrial use that will add little to the shippers' costs remains to be invented. Wood grids cost less than standard wood pallets, but cannot be used satisfactorily for tiering.

Along with developments in pallets and methods of palletizing, there are important steps in design and manufacture of containers. Some manufacturers of paperboard boxes of various forms and sizes believe they have built up widespread preference for their product over metal containers. This remains to be seen. Steel strapping has been in active demand to hold components of palletized unit loads securely in place over land and sea.

Steel skids, skid boxes, racks and other types of containers in virtually every sizeable manufacturing industry afford innumerable additional uses for fork and platform trucks. Special attachments have been devised for holding, rotating or otherwise manipulating loads, as for example, heavy rolls of newsprint. Many types of loads are handled on bare forks or platforms. These range from foundry slag to machine tools, 2-ton diesel motors; bales, casks, 10-ton dies for presses.

Crane Trucks Used

Other loads are handled with crane trucks, extensively so in the aircraft industry and in locomotive assembly and repair shops. Trucks sometimes first load then push or pull "trains" or trailers. Special devices have been originated to use some of the truck's power for purposes other than lifting and transporting.

The foregoing in general indicates the scope of operations and economies within the meaning of "Industrial Logistics."

General Motors' System: One of the first great manufacturing organizations in the United States to recognize the principles of "Industrial Logistics" is General Motors and its various units. They developed mass-handling methods to synchronize with mass production—part of General Motors' "Know-How."

A brief summary of operations at the group of five plants composing Chevrolet's gear, forge and axle division and its Pratt & Whitney engine division, Detroit, will show how their system works.

A basic principle is to keep all raw materials, parts in process, and completed parts and assemblies off the floor in skid boxes or steel frames or "cradles," so that they may be handled by means of power industrial trucks.

Stations have been established throughout the plants and trucks operate from these stations, as required, and routed by the supervisor and his assistants.

A machine operator takes material or a "part" from one box at his side, and as soon as he performs his work on it he deposits it in another. Thousands of boxes, loaded with 1 to 4 tons of parts, are constantly moving along miles of aisles, as though on a "floating floor."

The function of the materials handling supervisory staff is to see that materials and parts are delivered at the right time and to the right place—and kept moving on schedule. The supervisor's assistants, trained production men, are stationed in plant offices to direct the movement.

The system has been well organized; it works smoothly. But, if for any reason there is delay or stoppage anywhere, the nearest materials-handling man goes into action. If oncoming materials or parts threaten to pile up beyond a station's capacity to process, the same trucks that ordinarily move them forward in the normal sequence of operations are used to handle the surplus. It is similar to the practice of lifting a number of parts off an endless belt on an assembly line, so that failure at one point will not cause congestion or breakdown at another.

Power trucks assure flexibility and a degree of control not possible with ordinary manual facilities. The same trucks which bring material to a press, a forge or machine also serve to break "bottlenecks," or to by-pass them, as in the case of mass production assembly lines. The value of "keeping it off the floor" and in portable receptacles is repeatedly demonstrated. Tonnages of steel such as Chevrolet stamps, forges and machines every day could not be handled speedily or economically by other means.

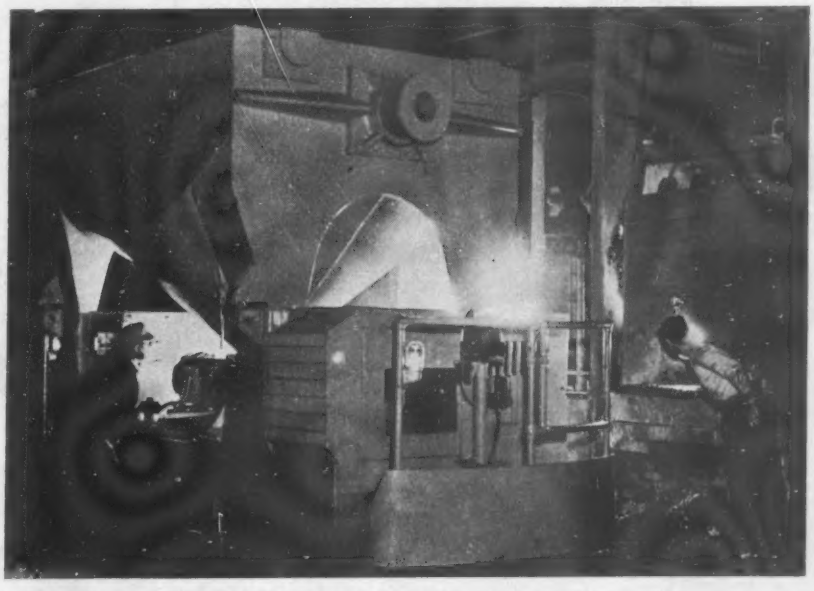
Uses of the trucks in the Chevrolet group are indicated by the illustrations. High-lift platform units work close to continuous-type annealing ovens. The high-lift is used because "skid boxes" loaded with parts hot from the ovens are run out to an adjoining open area and there stacked two or three high to cool.

On the other side of this area in that part of the plant where some parts receive their preliminary machining another high-lift platform truck is used in rather novel manner. The loaded boxes are first lifted onto a horizontal steel frame several feet off the floor. The truck backs out and the platform then is used to elevate the rear end of the frame to a point where it is made fast by a rod running through the supports. With the box tilted the parts slide by gravity to the woman machine operator who feeds them to the drill press, removes them and drops them into the box at her side.

Some of these boxes are riveted to their skids. Others have U-shaped supports at their four corners welded to the boxes. One advantage of this latter arrangement is that a truck's platform may be run under the box from any of four directions. The two types are clearly shown in most of the illustrations. Steel cradles of the type shown are used in large numbers of transport axles. Army truck axle housings are handled in unit loads of 36, strapped together with wooden cleats between them. The load is lifted by means of a fork truck.

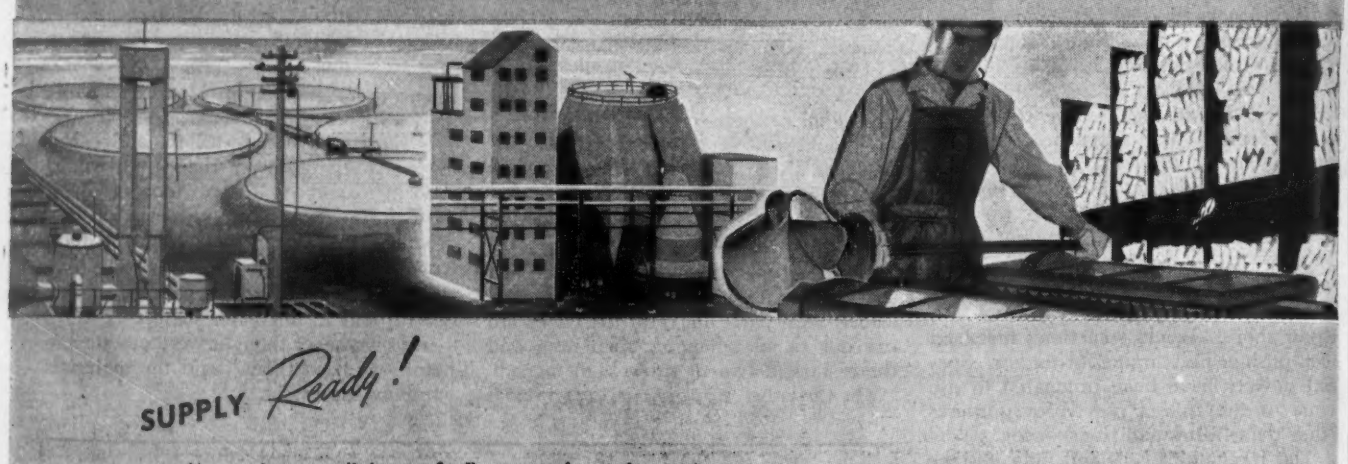
The great majority of handling operations are performed with platform trucks. The skids stand 10 to 12 in. above the floor. Anything lower than that would make a machine operator stoop or reach too far. Loads are heavy, frequently exceeding capacity of trucks rated at 4000 to 6000 lb.

"We are using more trucks than ever before, and in a greater variety of ways —ways we never thought were practicable before we tried them," said the materials handling supervisor.



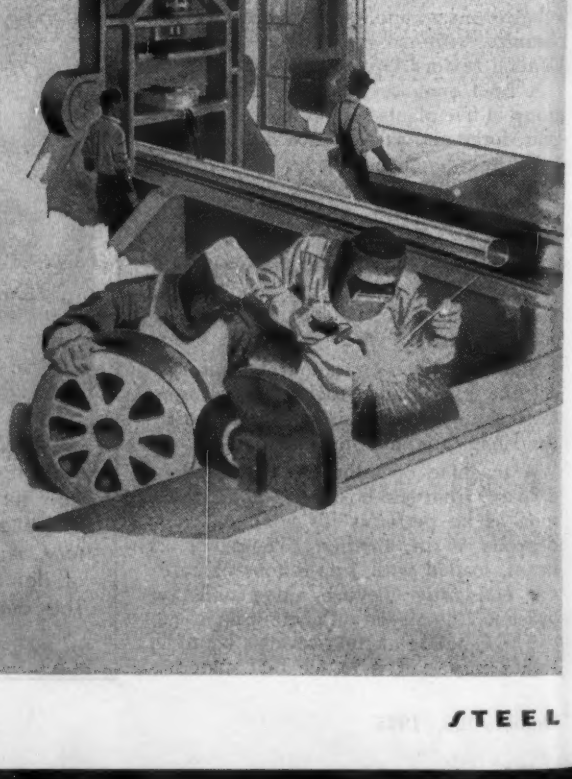
FURNACE SERVER: Improved visibility, flexibility, and greater speed of operation are features of a new dolomite throwing machine now serving steel furnaces. Throwing mechanism and hopper are mounted on a self-propelled carriage with controls for flow of material, direction and trajectory of stream. In spooning up front wall and banking doors, stream of dolomite is directed in such manner that it is deflected as desired. This diesel-electric generator powered model was developed by Blaw-Knox Co., Pittsburgh

Ready . . . to make products move!



SUPPLY *Ready!*

Magnesium . . . lightest of all structural metals . . . is today freely available to American industry. As pioneer and foremost producer of magnesium, Dow extracts this metal in abundance from ocean water and from natural underground reservoirs of brine. Magnesium, like other metals, is supplied in ingots and billets; extruded bars, rods, shapes, and tubing; rolled sheet, plate, and strip—and many additional forms. Present production capacity is ample for widespread use.



MANUFACTURERS *Ready!*

Manufacturers throughout the nation are ready to produce new lightweight products of endless variety—with magnesium! Serving these manufacturers are Dow-owned plants, as well as numerous independent producers of castings and mill products. Foundries, rolling mills, die casting shops, extrusion and forging plants—are all thoroughly experienced in magnesium fabrication and semifabrication. Over the years Dow has taken a leading part in establishing techniques and procedures covering every phase of handling and working lightweight magnesium.

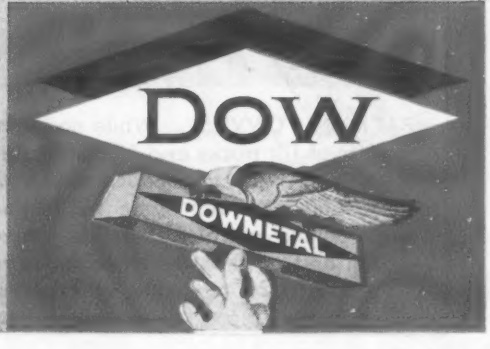
MAGNESIUM

LIGHTEST OF ALL STRUCTURAL METALS

Stimulated by the unprecedented demands of war, the magnesium metal industry has grown at a history-making pace. Today it is *ready* to satisfy a great consumer market . . . fabrication facilities are *ready* . . . manufacturers are *ready* . . . to supply the nation with new lightweight products of many kinds.

MARKETS *Ready!*

AMERICA IS READY FOR MAGNESIUM! People are ready now to buy new lightweight products of all kinds—home appliances, garden tools, sporting goods—made with magnesium! Factories are ready to buy lightweight industrial products—tools, machine parts, handling equipment, transportation units—made with magnesium! America is alert to these new advances in easier living . . . increased efficiency . . . lightened burdens. AMERICA IS READY FOR MAGNESIUM!



MAGNESIUM DIVISION • THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

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Cutting Under Water

(*Continued from Page* 103)

rate as the rod itself. If the coating burns off faster than the rod, sides of the rod near the tip are uncovered, leading to sticking in the cut. If it burns off too slowly, it forms a deep cup-shaped recess which prevents the operator from striking an arc against the work to restart the cut.

Scotch and acetate fiber tapes were found to burn too fast. Various other materials were tried, including strips of shellacked newspaper. White adhesive tape and black friction tape were both unsatisfactory because they formed a black gummy residue on the tip of the electrode.

Another requirement is that coating material be able to withstand immersion in water without disintegrating. This requirement ruled out many materials.

Material eventually selected is a special paper with a 40-lb pulp base, coated on one side with an adhesive somewhat similar to that on scotch tape. The material comes in coiled strip, about 2⅛-in. wide. This width is sufficient to make two complete turns on the rod.

Application of the tape to the rod is done by hand, special care being required in rolling the tape onto the rod to avoid wrinkles and in correctly positioning the covering lengthwise on the rod.

Each electrode is 14 in. long; 1¼ in. being left bare at one end to permit the electrode holder to grip the rod. About 7/16-in. is also left bare at the opposite end to permit the rod to contact the work directly to strike the arc.

Special Electrode Holder: Since the electrode holder must also seal the end of the rod and afford means for connecting the hollow core to the source of oxygen, a special holder has been devised and patented to seat the end of the rod against a rubber gasket, locking the rod in position by means of a cam.

Electric current is carried to the rod through the holder which also provides good electric connection. Holder is thoroughly insulated, is small and light in weight to aid manipulation in tight places.

To prevent any portion of the holding mechanism from accidentally contacting and arcing against the work, a micarta insulating cup extends out from the electrode grip around the rod for a short distance.

A valve in the holder is operated by a finger grip to control flow of oxygen so none is wasted when not cutting. In operating the cutting electrode, the valve is squeezed to start the flow of oxygen *BEFORE* the arc is struck and is held depressed to continue flow of the gas during the cutting.

Commercial bottled oxygen is employed with unit pressure at the electrode, depending upon the depth of water at which cutting is to take place and the thickness of material being cut; deeper water requiring additional pressures to overcome water pressure; thicker steel requiring additional pressure to get oxygen to the far side of the cut and to get sufficient erosive action to keep the cut clear.

Manipulation: It is not difficult to learn to manipulate the cutting electrode correctly. In fact, a green operator can make acceptable cuts in his first few attempts. To start a cut, the operator squeezes the valve starting the oxygen jet and touches the electrode tip to the work with a slight "wiping" action as in striking a match, the same technique required to start the arc for welding. Cutting action starts immediately upon contact of the electrode on the work as the arc instantly produces a molten "puddle" that combines with the oxygen.

The oxygen jet also ignites the end of the electrode which helps in maintaining the arc till the work ignites. Valve is held depressed during the entire cut.

Operator must hold the electrode over one point on the work till the oxygen jet has had an opportunity to completely pierce the plate to be cut, moving the electrode in to the arc as the rod burns off. As soon as the plate has been cut through, operator then moves the rod in the direction of the desired cut, keeping the tip of the rod in the cut.

Or if the cut is to be started at a plate edge, arc is struck on near corner and jet held there till the cut has been started.

Electrode is not hard to guide, although the action is somewhat different than when welding due to the slag formation which tends to make the jet change its direction, producing a ragged cut. After a cut has been made in light metal or where the section cut off is small, usually some of the slag or burned steel will have bridged the cut at various points so that the two plates will have to be broken apart; they seldom fall apart after cutting. If section cut is thick, weight of the cut portion is usually sufficient to break the bond formed by the burned scale.

Good Cutting Rates: The table gives typical current, voltage, gas pressures, cutting rates and burn-off rates for cutting various thicknesses of steel at water depths ranging from 10 to 40 ft. Most heavy cutting is done at 300 amp (direct current with electrode either positive or negative), at about 55 v, although the electrode can be used satisfactorily at currents ranging from 200 to 600 amp, 35 to 70 v. It can also be used on alternating current but then requires more careful manipulation.

In 1-in. plate, kerf or width of cut it is usually 5/16-in. or slightly larger. Edges of cut are usually ragged, due to the comparatively large orifice. However, refinements are being developed which are expected to improve this characteristic.

Oxygen pressures vary from 20 to 60 psi according to depth under water. Plate up to 8 in. thick has been cut successfully with this equipment, reports Mr. Wattles.

Typical speed for cutting 1-in. plate 60 ft under water is given as 20 ipm when using 300 amp at 45 v with oxygen pressure of 55 psi. Under these conditions, burn-off rate of the rod is 15 ipm. This relation of rod burn-off to length of cut holds under most conditions, the length of rod burned off being about three-fourths of the length of the cut produced. About 13 in. from each 14-in. electrode can be utilized, as the electrode can be used down to a 1-in. stub.

No Depth Limitations: Since it is

BACK IN "CIVVIES": While no major reconversion problem confronted makers of lift trucks and industrial tractors, many makers of such equipment were ready to produce new models soon after V-J Day. Shown is a versatile new unit made by Towmotor Corp., Cleveland, already at work pulling a train of dollies mounting packaged goods. Improved design and construction features incorporated in new tractor models are based on a wealth of experience garnered in war years

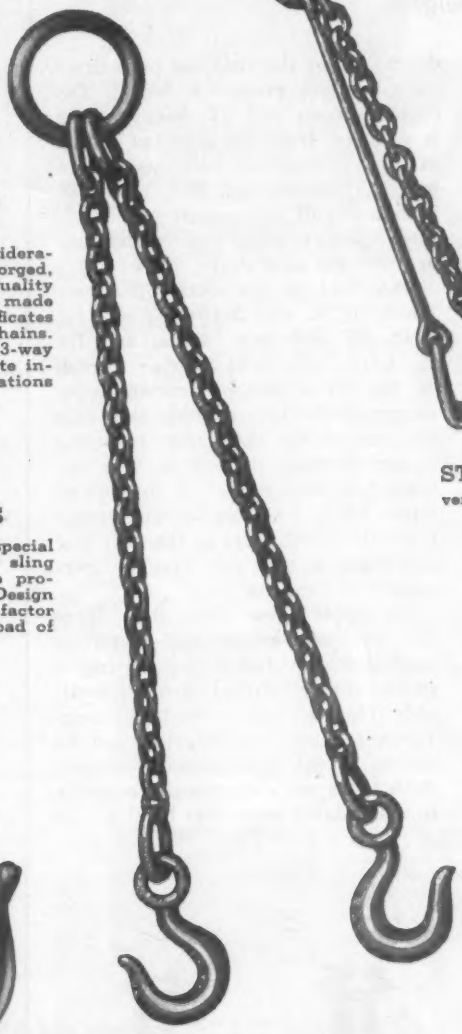
GET THE RIGHT TYPE CHAIN FOR THE JOB

SLING CHAINS
Dredge Quality

Where safety is a first consideration, specify hand-forged, shock-resistant Dredge Quality Sling Chains such as are made by Cleveland. Test Certificates furnished with all sling chains. Made in single, double, 3-way or 4-way types. Complete information and specifications upon request.

SLING HOOKS

Drop forged steel, special heavy construction for sling chain use. Large eye provides free movement. Design affords ample safety factor beyond safe working load of hook.



STYLE C with End Ring used at top for lifting barrels in vertical position.

BARREL CHAINS

STYLE C—Adjustable for lifting barrels in either vertical or horizontal position.

STYLE C with Center Ring used at top for lifting barrels in horizontal position.

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Uniform Quality — Dependability Since 1869

ALL TYPES OF CHAIN, WELDED & WELDLESS

FLAT METAL CHAINS, CHAIN FITTINGS

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practical to use oxygen jet pressures of almost any desired value, there is no factor limiting the depth at which the cutting electrode can be used efficiently. Cutting at simulated depths up to 280 ft has already been accomplished in pressure chambers.

Fast In Air: In addition to being very effective in cutting under water, the speed of the system makes it valuable for much cutting in air especially in cutting cast iron. Mr. Wattles explains that the electrode is ideal for cutting cast iron in air because the molten steel from the electrode helps to "wash" the molten cast iron out of the cut to produce a highly efficient cutting action, whereas the conventional oxyacetylene cutting torch forms a puddle of oxidized metal which tends to clog the cut.

Another advantage of the new process is that no preheating is required, cutting starting instantly either in water or air. And if for any reason the "cut" or chemical reaction of the oxygen cutting jet is "lost" due to poor manipulation, etc., the action can be restarted instantly by restriking the arc.

At the same time the arc itself melts some of the metal to be cut and thus aids and speeds the cutting action. This combination makes the cutting speed much faster than conventional cutting, the usual job being done in about 66 per cent less time; that is, a cut that usually requires 3 min with the oxyacetylene torch can be made in 1 min with the cutting electrode, it is reported. Thus the new cutting method is expected to find considerable application for cutting in air as well as in water.

Important Peacetime Applications: Now that the fighting is over, an enormous amount of work must be done to clear harbors of sunken vessels, rivers of wrecked bridges, and a great volume of similar underwater salvage and clearance operations. In addition, considerable construction work is expected to employ this development to advantage.

One of the features of the process that appeals to repair men is that portable electric welding sets can also be used for high speed cutting simply by the addition of a tank of bottled oxygen whereas conventional gas cutting would require a bottle of fuel gas as well — a total of two tanks instead of one. This feature has already proved valuable in battle, where the famous jeep equipped with an arc welding generator has been used to repair battle damage right in the field. Addition of an oxygen bottle with the new cutting electrode holder, cable and a supply of electrodes enables cutting to be done effectively.

Self-Opening Stud Driver

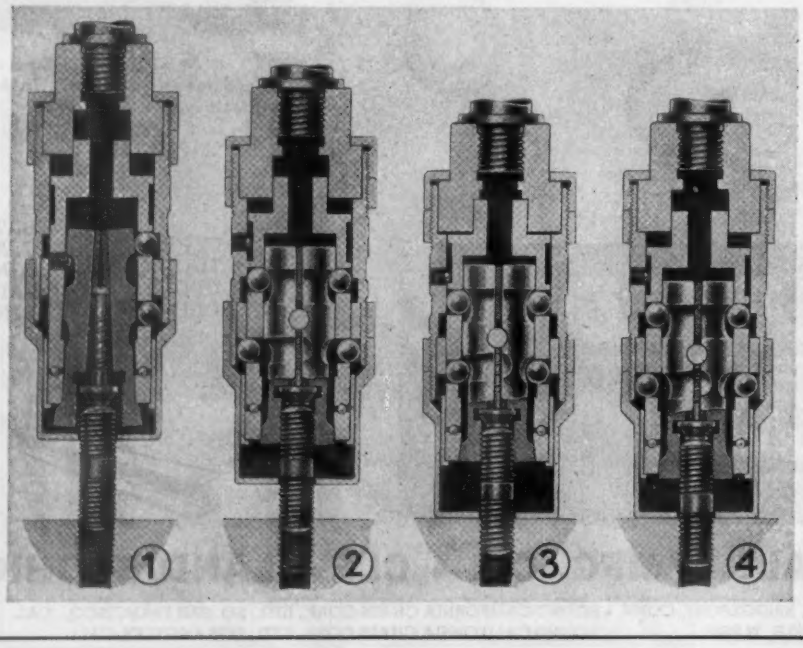
. . . . incorporates automatic take-up for wear on jaws, affords exceptionally accurate maintenance of projection heights

AUTOMATIC take-up for wear on the jaws is featured by a new self-opening stud driver designed for rugged use and also to eliminate marking of stud threads. As threads in the jaw become worn, action of the driving balls on the jaw drive shoulder tend to pull the jaws up in the taper nose bushing, causing them to close in on the stud.

This stud driver, made by Titan Tool Co., Fairview, Pa., operates at any speed desired. Tool, prior to loading, is shown in Fig. 1. Tool with jaws locked in full register on stud by upper balls, but without lower balls in positive driving position, is shown in Fig. 2. Lower balls then join upper balls in locking jaws in full register with stud, Fig. 3, before any driving force is applied to the stud. At this point the tool can revolve, with the exception of the jaw, ball bearing nose bushing, and the stud. After jaws are locked in position, tool is free to come down into positive driving position, the two lower balls doing the driving directly on the jaw. Driving balls also pull jaws up into taper nose bushing as stud is driven to proper depth. After the stud has been driven to correct projection height, the cycle reverses and all driving force is removed from the jaws, as shown in Fig. 4. Drive balls again are in free position, but with jaws still locked in full register, as in Fig. 2. Jaws open up when tool is lifted up to drive the next stud.

This tool is made in four sizes: For 3/16, ¼, and 5/16-in. studs; for 5/16, ⅜, and ½-in. studs; and for ½, 9/16, and ⅝-in. studs. Clutch on the driver can be renewed very inexpensively by pressing the cam ring out of the main ring, reversing it, and pressing it back in, thus obtaining double wear. A low-priced repair kit is available for this operation. After both sides of the cam ring are worn, a new one may be purchased at low cost.

For applications where it is desirable to limit the amount of torque applied to the stud during driving, a special controlled stud driver is available. This tool has an adjustable overrunning clutch so that stud can be driven to any predetermined torque. Both types are exceptionally accurate in maintaining projection heights.



Positive Action Clamp Resists Vibration

Basic design of a new clamp with an automatic engagement and release mechanism retains positive action of a conventional C clamp by means of a floating nut with cam-wedge action, which engages the screw threads when pressure is applied. Due to action of the cam-wedge, the release device does not become operative until all pressure has been relieved, making unit adaptable for clamping operations where vibration tends to loosen clamps. Production of clamp has been started by Rapid-Titan Mfg. Co., Grand Rapids, Mich., for Michigan Distributors Inc., of that city, sales agent.

A pictorial explanation of the "how" and "why" of Thompson Crush Form Contour Grinders
THE CONTOURS
THE REQUIREMENTS
THE GRINDING MACHINE

Case Histories

Pictorial booklet explains THOMPSON TRUFORMING

. . . production with COMPLETELY ENGINEERED Crush Form Contour Grinders

THE fully automatic Crush Form Contour Grinder, illustrated above, is one of the (Thompson Truform) surface grinders *completely engineered* as a unit and built by the Thompson Crush Form Contour Grinding Development Laboratory to mass produce a complicated precision contour. The complete story of this application, together with the development of a semi-automatic (Thompson Truform) machine for job-lot contour production and regular surface grinding, is included in a new 16-page pictorial book, entitled "Facts About Crush Form Grinding Precision Contours." This book, the first of its kind, is a result of ten years of pioneering research and engineering by THE THOMPSON GRINDER COMPANY, SPRINGFIELD, OHIO.

Get these facts today!

Crush-Form-Contour-Grinding
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The Thompson Grinder Company, Inc.
Dept. 11, Springfield, Ohio

Gentlemen: Please send me the 16-page pictorial book of facts about crush-form contour grinding on completely engineered surface grinders (the process known as Thompson Truforming).

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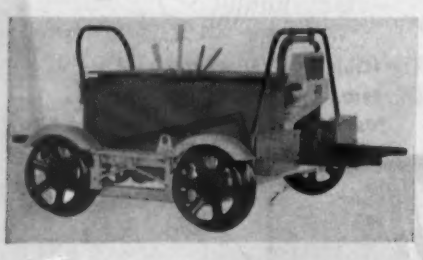
INDUSTRIAL EQUIPMENT

Inspection Car

Light weight is featured in the one man railway inspection car introduced by Fairmont Railway Motors Inc., Fairmont, Minn. Haskelite Plymetl, a combination of metal and plywood, is used for the tool tray floors located on either side of the car. Phemaloid, a light yet



heavy duty plywood is used in the seat material. Seat top is removable for access to the engine for cleaning or adjustments. Handling ease is imparted by location and design of extension lift handles which may be pulled out from either end. With handles extended rear lift is 98 lb.

Spring mounted axle bearings insure smooth riding. Axle bearings are double row tapered roller bearings. Endless cord belt drive has an idler pulley to control belt and give easy starting. Power is supplied by a 5 to 8 hp, two cycle, single cylinder, Fairmont water-cooled roller bearing engine.

Arbors for Grinding

Special arbors for grinding, where a high degree of accuracy is required with respect to runout on ground surface, have been developed by General Electric's Pittsfield Works. They eliminate the necessity of having different arbors made to fit varied conditions as they may be used on parts with tapered holes or those having holes with two different diameters.

Arbors are made from hardened, ground steel with centers in both ends. Part of it which turns the work is tapered 1½ in. to the foot which is just enough to turn the work but not to bind the hole. Removable tapered sleeve has the same taper on spindle and is a good fit on straight shank of arbor.

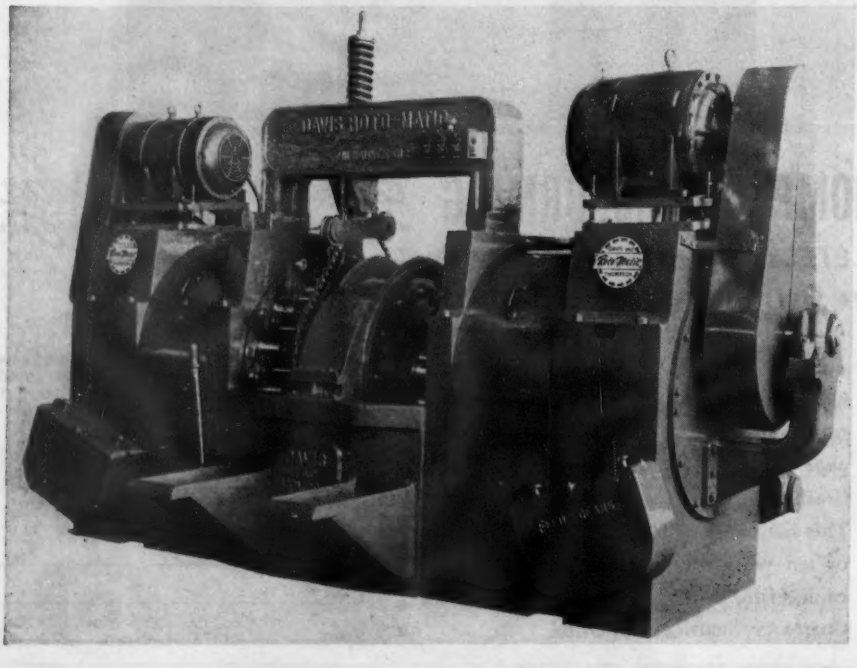
Drilling Machine

Type 2H Roto-Matic 24 spindle horizontal continuous drilling machine is announced by Davis & Thompson Co., 6411 West Burnham street, Milwaukee 14, for drilling identical or similar parts, parts that require drilling from both sides or parts that require a drilled hole from 7 to 12 in. deep. The unit shown here was adapted to drilling of steering knuckles from both sides at the same time. These holes were $\frac{13}{16}$-in. in diameter and 1½-in. deep.

When deep holes are drilled from both sides, completely through work piece, drills are fed by a cam so that feed on one end carries drills to within approximately $\frac{3}{8}$-in. of center line of work piece. Drill from opposite side feeds beyond center line to complete hole. Starting drill backs out while hole is being completed.

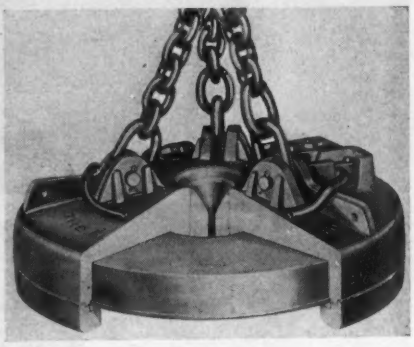
Two 20 hp motors constitute driving force for the drill spindles while the motor on the left hand side also rotates the mandrel fixtures and spindle housings. This arrangement provides for continuous operation of the machine. Operator places work pieces in the machine at loading station. As work advances the automatic chain clamping is actuated and piece securely clamped preparatory to drilling. Cams feed spindles and drills to and through the work. After the operation is completed, spindles are returned to starting position by a return cam and clamping is automatically released.

A new feature of this machine is that the entire fixture and work piece are submerged in a coolant tank while drilling is performed. This assures coolant to the drill point while the work piece is cooled from the outside. A chip conveyor continously removes chips from the bottom of the tank while machine is in operation. Chip conveyor is driven by an independent motor. A manual clutch lever is provided for stopping feed while motors are controlled by pushbuttons. Antifriction bearings are used wherever possible.



Lifting Magnet

For general lifting magnet service, handling pig and scrap iron, slabs, castings and similar materials, Electric Controller & Mfg. Co., 2700 East 97th street,



Cleveland, announces type SW all-welded lifting magnet.

It has the coil enclosed and hermetically sealed by continuous welds in a metal case. In the accompanying illustration, the magnet housing has been cut away to show how this metal encased coil is welded into the housing to provide a double seal against entrance of moisture. Welds are continuous along inner and outer circumferences of the coil case and magnet housing.

Inner and outer pole shoes are also welded in place to form a streamlined magnet with straight sides. There is no overhang to catch on sides of railroad cars and elimination of recesses in side of magnet for bolt heads permits a magnet of full diameter throughout its depth. Coil case after welding is vacuum treated and filled with a new compound which is then baked until it polymerizes to a stable condition. This thermosetting compound is resilient and clings to metal, has high dielectric strength, will not

All claims are those of the manufacturer of the equipment being described.

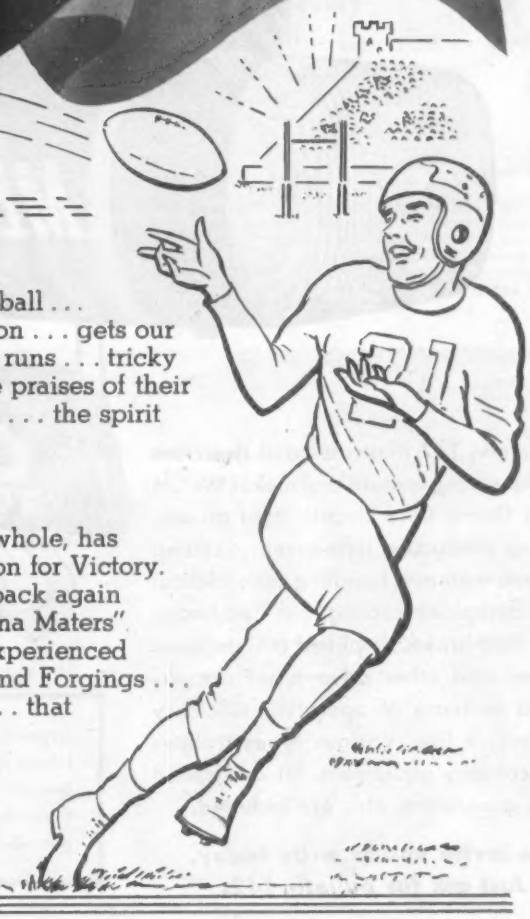
impressions ~~that last~~..

• PEACETIME college days again. Football . . . competitive sport rather than competitive destruction . . . gets our attention. Sizzling forward passes . . . dazzling end runs . . . tricky team plays which bring the crowds up singing the praises of their "Alma Mater". It's that real old college spirit again . . . the spirit that creates

impressions that last!

• During the last five years, industry, as a whole, has had a trying time—busy concentrating on production for Victory. Today, happily, that tension is gone and we're all back again singing the praises of our "peacetime industrial Alma Maters". Modestly, we too, voice the claim that it's Finkl's experienced ability to produce Top Quality Rams, Piston Rods and Forgings . . . plus our "KNOW HOW" on Hot Work Die Steels . . . that have and are creating

IMPRESSIONS THAT LAST!



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TOP QUALITY
processed steels

CM METEOR

Here is the Subtractor of Materials Handling Costs

CM Bulletin 142 illustrates and describes every operating feature that makes the CM Meteor Heavy Duty Electric Hoist an outstanding production time-saver . . . cutting deep into materials handling costs. Helical gears, aeroplane cooling, low headroom, safety limit brake, simplified maintenance . . . these and other advantages are explained in terms of operating efficiency and service life. Various types trolleys and accessory equipment, lift and speed tables, dimensions, etc., are included.

We invite you to write today. Just ask for Bulletin 142.

Capacities from ½ ton and up. Lifting speeds from 18 to 60 feet per minute . . . Low headroom. Hook suspension, plain, geared or motor driven trolley.

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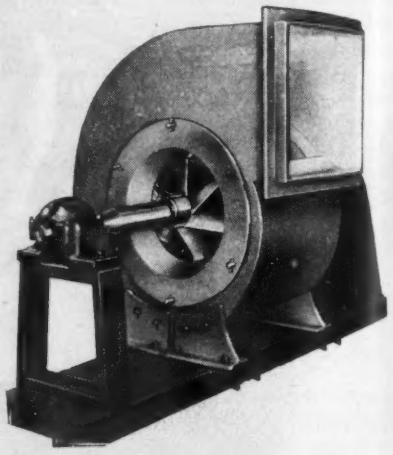
melt under heat and will not become brittle.

High Temperature Fans

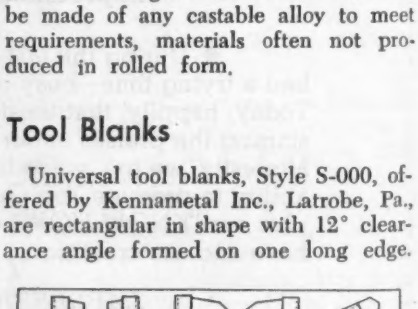
The new high temperature heat-resistant alloy fans introduced by Michiana Products Corp,. Michigan City, Ind., are designed specially for handling hot gases or products of combustion in heat conservation systems in industrial plants; for annealing, hardening, drawing, stress relieving, galvanizing, tin-



plating and many other types of furnaces, as well as for ceramic plants, soaking pits and the like where temperature requirements range from as high as 1800° F. The fans provide controlled recirculation, utilized to hold furnace temperatures within close limits and also provide flexibility required in "program" heating and cooling. Construction of the units eliminates use of screws, bolts, rivets and welds. Vital operating parts are assembled so that they are free to expand and contract independently of each other radially and axially, thus avoiding distortion and unbalancing of the fan wheel. Fans are available with double or single inlet wheels and can be made of any castable alloy to meet requirements, materials often not produced in rolled form.

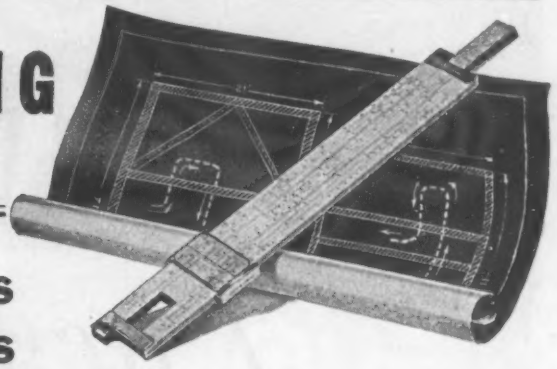
Tool Blanks

Universal tool blanks, Style S-000, offered by Kennametal Inc., Latrobe, Pa., are rectangular in shape with 12° clearance angle formed on one long edge.

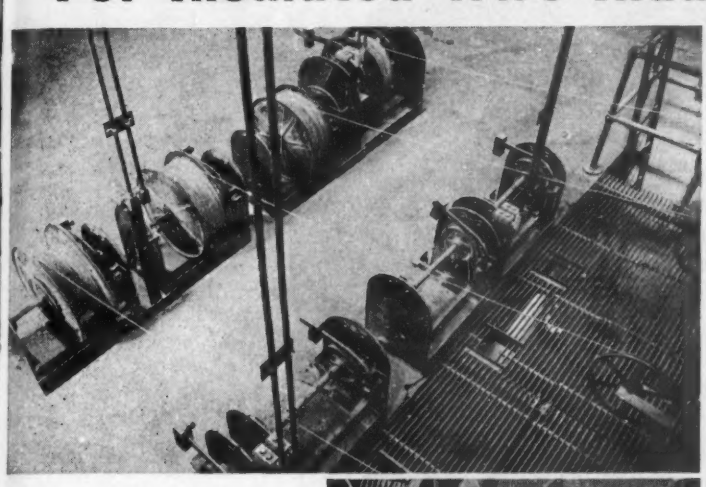


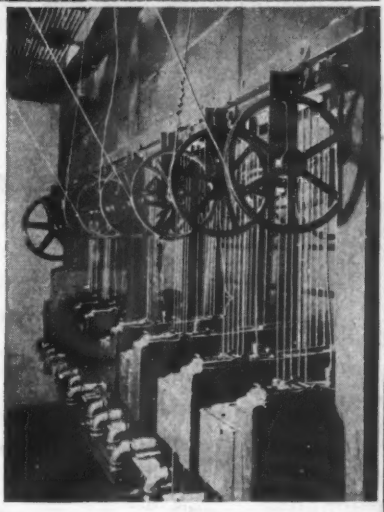
They can be used to make many different types of tools by setting them into open-end recesses, as illustrated. They are available in all recognized standard sizes, having thicknesses of 3/16-in. or more. Many sizes are stocked in steel cutting grades.

OVEN ENGINEERING NEWS



IOE Cable Lacquering Systems Set New Efficiency Standards For Insulated Wire Industry





Above: Here are the controlled-tension payoff stands for an eight-end wire and cable lacquering system which was designed, built and installed by the Industrial Oven Engineering Company. The wire is drawn from the payoffs through the saturation and lacquer pots (right).

THE lacquering equipment shown on this page, installed in the plant of a large Eastern wire manufacturer, is capable of finishing up to 600,000 lineal feet of medium sized wire and cable per eight-hour shift, including saturating, lacquering and baking, in a single continuous automatic process. The wire produced has greatly improved surface gloss, cross sectional accuracy and dielectric strength.

Such **IOE** systems are easy and economical to operate. The combination of simple, tension-controlled payoff stands, readily accessible lacquer and saturation pots, and **IOE** high-speed constant-tension windup machines, engineered into a completely automatic system, enables one man to handle an eight-end operation without difficulty, bringing labor cost down to rock bottom. Proper oven engineering of the lacquer tower, which can be heated by electricity, gas, oil or steam, affords considerable savings in fuel.

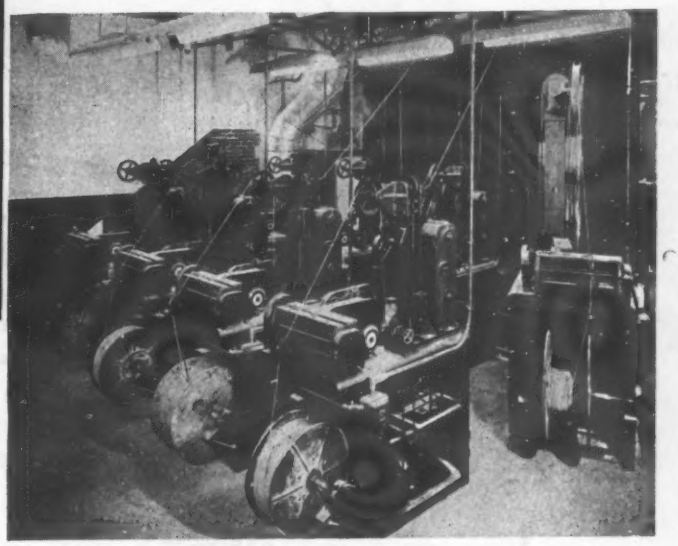
In other industries, the same general type of system is equally efficient in the impregnating and coating of such materials as paper, textiles, tape, rope, fishline, surgical suture, etc.—in short, any continuous material which requires processing and baking.

Next month's Oven Engineering News will show pictures of another **IOE** wire and cable installation, with data on economy and efficiency supplied by a well known user.

Get The Whole Story

A detailed description of the basic **IOE** cable lacquering system is available in a 16-page reprint of our article in WIRE AND WIRE PRODUCTS. Write today for your copy.

Below: The eight windup machines corresponding with the payoffs in the photograph left above. These constant-tension, variable-speed units draw the wire from the payoffs, through the saturation and lacquer pots, and through the oven tower which is shown in the background, winding it onto reels after the lacquering and drying process has been completed.



(This is No. 22 of a series. Reprints of previous advertisements sent free upon request)

IOE ENGINEERING VERSATILITY

THE INDUSTRIAL *Oven Engineering* COMPANY

11621 DETROIT AVE., CLEVELAND 2, OHIO

Engineering Representatives in Principal Industrial Areas

★ **ASSOCIATED COMPANY: JAMES DAY MACHINERY LTD., LONDON, W. 1, ENGLAND** ★

WHITCOMB Locomotives

Easily controlled power above its rated capacity

In every mill or plant where WHITCOMB INDUSTRIAL TYPE LOCOMOTIVES daily roll up impressive records for efficiency and economy, owners are enthusiastic over their selection of motive power. Their selection of WHITCOMB is based on hard-headed materialism. Their attention was first directed perhaps by an advertisement like this: then they investigated the claims set forth—claims that the WHITCOMB has power far above its rated capacity, that it bears up under punishing hours and conditions, that it delivers greater switching and haulage service on budgeted horsepower, that its operating costs are low, and its maintenance costs are scarcely worth recording. When the need of an industrial power unit was evident, WHITCOMB was thoroughly investigated, and the WHITCOMB sold itself. When YOU come to the point where switching and haulage service is growing into a problem, we will be glad to help solve it.

DIESEL or GASOLINE POWER — MECHANICAL, HYDRAULIC or ELECTRIC DRIVE

THE BALDWIN GROUP

THE WHITCOMB LOCOMOTIVE CO.

ROCHELLE, ILL.

Subsidiary of THE BALDWIN LOCOMOTIVE WORKS

Carbide Tool Tips

(*Concluded from Page* 109)

in a rivet heating furnace converted for this work.

Here tools brazed with Easy Flo No. 3 are heated in a furnace at 1600° F and removed by tapping back of tool to jar off the tip as soon as the alloy melts. New tips are brazed back in place in a fixture that holds the tool, heating being done by fixed torches and Easy Flo No. 3 being used.

For removal of copper brazed carbide tips, Robert Mitchell, Tool Standards Committee, General Motors, reports the following recommended procedure: Use cold concentrated nitric acid with a specific gravity of 1.42—that is important. Clean tools of all grease and oil. Immerse in acid bath so tools do not touch each other, with bath at room temperature. Gradually raise temperature to 140° F and allow tools to rest undisturbed for about 45 min. Remove immediately and wash in plain water. Dry the tools and pull out the tips with fingers. About 65 per cent will come off on the first treatment. Repeat the entire cycle for those that do not come off.

Fumes from the nitric acid bath are dangerous and should be promptly removed from the area by proper ventilation.

Accompanying illustration shows a typical plan and elevation for a hot nitric acid setup for removal of carbide tips.

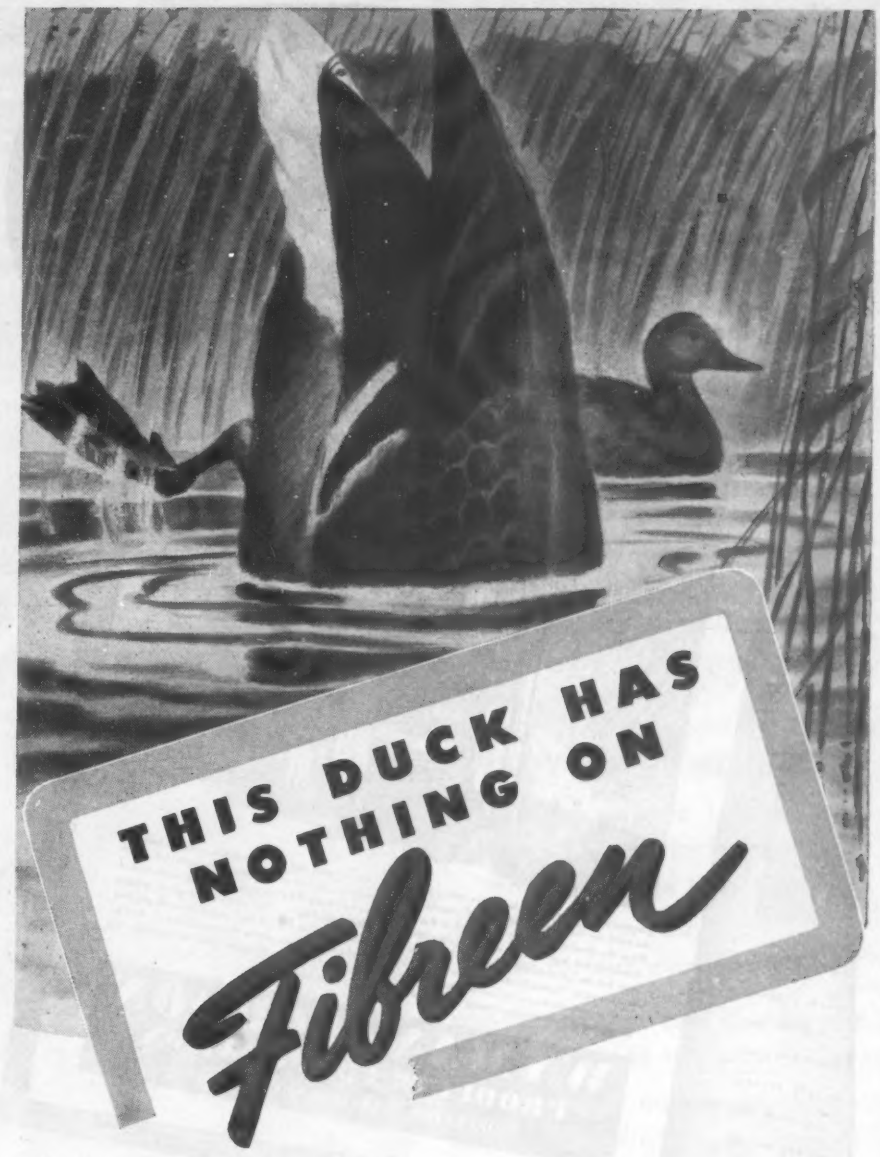
Rephosphorization in Slag Studied

Results of investigation show that rephosphorization during casting is due to a change in composition of slag by enrichment of the silica content resulting from its reaction with fireclay lining of ladle. Y. K. Zea, of Messrs. Steel, Peech and Tozer, Sheffield, England, has reported to the Iron and Steel Institute with basic material; and that the degree of rephosphorization, when a fireclay-brick-lined ladle is used, may be controlled to a large extent by keeping temperature of slag and metal in the ladle as low as possible, and by adjusting slag composition so that, in spite of reaction with ladle lining, basicity of slag will not fall below a certain minimum necessary for holding phosphorus. Latter aim can be achieved, when circumstances permit, by increasing lime content of slag.

Test Milling Machines

Construction of three test milling machines designed by Diamond Tool Co., Los Angeles, along original lines approved by the Army was announced by John K. Sutherland, sales manager.

Mill is of bench type and carries coolant in a tank in the base. Built to tolerances of accumulated error of less than 0.001-in., machine has a weight of 650 lb and may be moved readily.



THERE'S as much chance for water to penetrate Fibreen as to soak through the feathers of a duck.

Hair pins or housing gears . . . baby buggies or bowling alleys . . . big shipments . . . little shipments . . . look alike to Fibreen when it comes to perfect protection in shipping . . . from water, dirt, dust and rough handling.

Fibreen reenforced paper is as flexible as a cord yet tough as cow-hide. It is acknowledged as the best of all by industry for any kind of wrapping job . . . small or large.

If you haven't used Fibreen to guard your goods en route to destination, by all means write today for a life-sized sample and case histories of how other manufacturers have used it.

Fibreen has "dived" into many a tough shipping problem and "come up" with the right answer.

Sisal-fibre reenforcement for strength . . . special asphalt for water-proofness . . . kraft paper for clean, easy handling . . . sealed by heat and under pressure to produce Fibreen.

THE SISALKRAFT CO.
205 W. WACKER DRIVE · CHICAGO 6, ILL.
NEW YORK SAN FRANCISCO LONDON SYDNEY

Manufacturers of SISALKRAFT, FIBREEN, SISAL-X, SISALTAPE AND COPPER-ARMORED SISALKRAFT

The largest die forging press in the world, recently announced by Wyman-Gordon Products Corporation, "will make available larger magnesium and high strength aluminum alloy forgings than any yet made."

Wyman-Gordon Products Corporation selected these types of R-S Furnaces for the heat-treatment of work to be turned out by this press.

3 R-S Continuous Convection Type Forging Furnaces

1 R-S Convection Type Heat-Treating and Aging Furnace

This is another instance of selection due to R-S high-quality construction coupled with R-S designing ingenuity and dependable performance.

R-S Furnaces of Distinction

FURNACE DIVISION
R-S PRODUCTS CORPORATION

122 Berkley Street • Philadelphia 44, Pa.

Zinc Electroplating

(*Concluded from Page* 114)

tion produce an electrolytic couple, the result being electrochemical corrosion of the zinc when the bath is idle. Then, when operation is started, there is a rapid decrease in the zinc content of the bath due to steel anodes.

Preparation of Base Metal for Cyanide Zinc Plating

A chemically clean surface is important for good plating. In general, polishing compounds, stamping lubricants, heavy oils, etc., should be removed by solvent degreasing prior to alkaline cleaning and acid pickling. Effective alkaline cleaning of steel can be obtained by using "heavy duty" commercial cleaners and these are especially recommended for cleaning polished steel. Following the alkaline cleaning style, an acid pickle of 4 to 20 per cent hydrochloric or sulphuric acid may be used for removal of rust and scale. The time of immersion in the acid pickle must be long enough to insure adequate removal of rust and scale without over pickling. To insure rapid and adequate covering with zinc over-pickling must be avoided since this produces a smut or dirty surface that is difficult to cover. For removing light rust or scale from steel the following pickle has been used:

Muriatic Acid (31%)	1 part
Water	3 parts
Temperature of Solution	120°-180°F

For removal of heavy rust and heat or fire scale the pickle given below has been used:

Sulphuric Acid (66°Be, 96%)	2 parts by volume
Muriatic Acid (31%)	1 part by volume
Water	7 parts by volume

Thorough rinsing in water after acid pickling is essential.

After grease and rust or scale have been removed a brief immersion in a dilute sodium cyanide solution aids in producing a uniform, chemically clean surface prior to plating. A solution of the following composition has been used:

Sodium Cyanide	2-6 oz/gal
Temperature	120°-160°F
Time of Immersion	1-10 min.

In difficult cases anodic current in the sodium cyanide solution may be useful.

Given in Fig. 18 is a typical flow diagram for still and barrel plating operations in cyanide zinc baths; Table IV gives a time-amperage table for cyanide zinc plating.

REFERENCES

[43] See Reference 35, p. 372; also see reference 14, p. 331.

[44] Hull, U.S.P. 2,149,344.

[45] McIntyre and Hull, Proc. Am. Electroplaters' Soc. (1943).

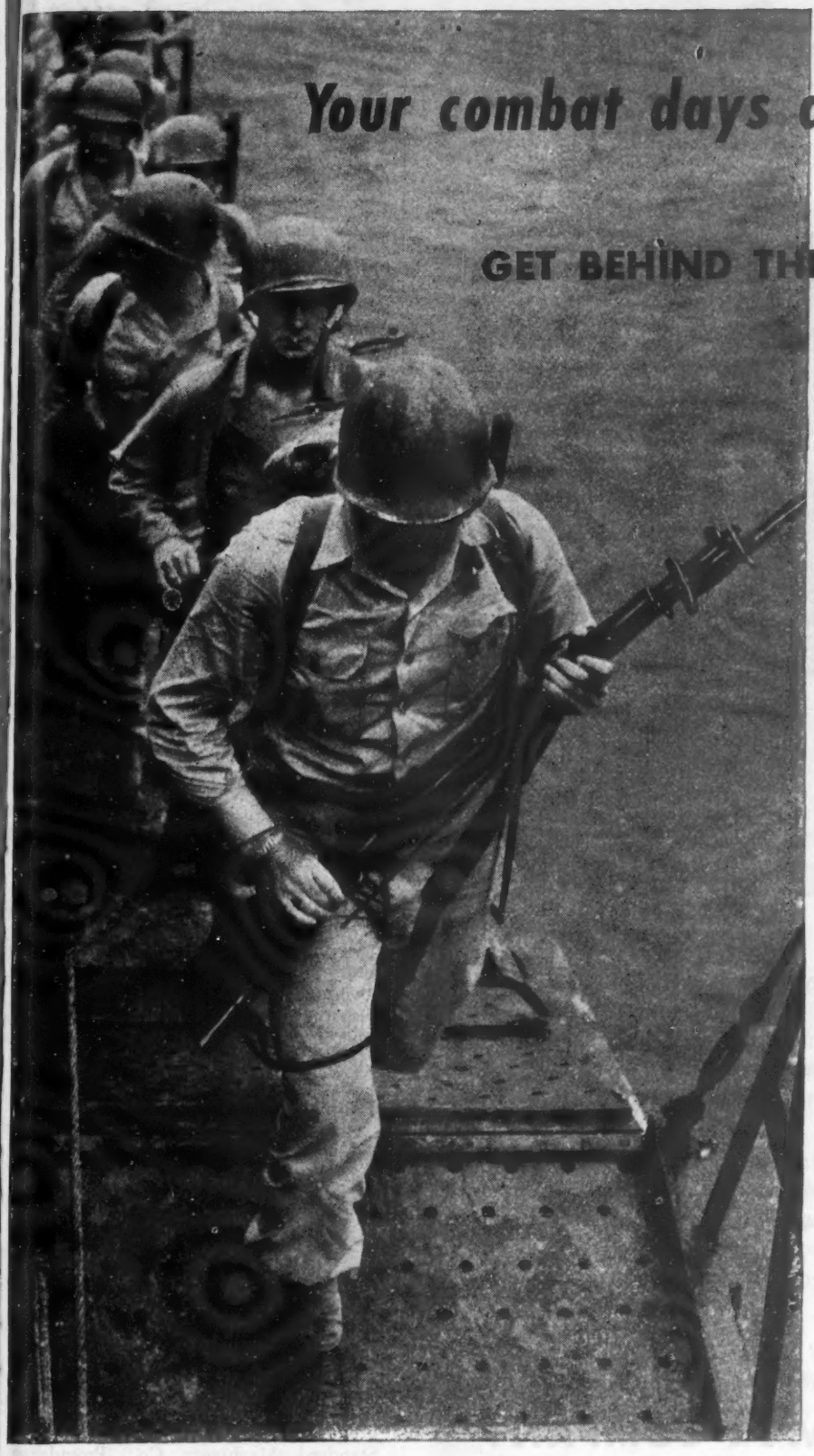
[46] The Zin-O-Lyte plating process is covered by U. S. patents 2,080,520; 2,146,439; 2,164,924; 2,196,588; 2,214,331; 2,218,734; 2,233,500; 2,243,696; assigned to Du Pont Co.; other patents pending.

[47] For analysis see Am. Soc. for Testing Materials Designation B6-37, ASTM Standards 1940, Part I, p. 680.

[48] Hull, Conv. Proc. Am. Electroplaters' Soc. (1940); U.S.P. 2,214,331; Ferm U.S.P. 2,243,696.

[49] Hogaboom U.S.P. 1,887,841; Graham U. S.P. 1,888,202; Trans. Electrochem. Soc. 63, 121 (1933).

(*Continued next week*)



Your combat days are not over!

GET BEHIND THE VICTORY LOAN!

There's plenty of action ahead for fast-thinking industrial leaders in putting over the new Victory Loan! Your Victory drive is important because:

EVERY VICTORY BOND HELPS TO

1. **Bring our boys back to the America for which they were willing to give their lives!**
2. **Provide the finest of medical care for our wounded heroes!**

BOOST THE NEW F. D. ROOSEVELT MEMORIAL $200 BOND!

Urge all your employees to buy this new Franklin Delano Roosevelt Memorial $200 Bond through your Payroll Savings Plan! At all times better than ready cash, Victory Bonds are industry's "Thanks" to our returning heroes!

START YOUR VICTORY DRIVE TODAY!

Every Victory Bond aids in assuring peacetime prosperity for our veterans, our nation, your employees—and your own industry!

The Treasury Department acknowledges with appreciation the publication of this message by

VICTORY LOAN

STEEL

★ *This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and War Advertising Council* ★

LIQUID OR GAS TEMPERATURE CONTROL PROBLEM?

These publications describe the NIAGARA AERO HEAT EXCHANGER and some of its applications. It accurately regulates the temperature of gases and liquids. Industrial plants using chemical and heat-treating processes have gained extra benefits from using this equipment wherever cooling water is used or any fluid is cooled to exact temperatures.

Some of the applications are: controlling temperature of liquid chemicals and intermediates in process; controlling jacket water temperature in power and process equipment; regulating the temperature of controlled atmosphere; controlling liquid bath temperatures.

As a cooler, the NIAGARA AERO HEAT EXCHANGER saves the cost of 95% of the water circulated.

Niagara Bulletins 90, 94 and 96 give detailed information. Write for them today.

NIAGARA BLOWER COMPANY

Over 30 Years of Service in Industrial Air Engineering

DEPT. S-105, 6 E. 45th St. NEW YORK, 17, N.Y.

Field Engineering Offices in Principal Cities

INDUSTRIAL COOLING HEATING • DRYING

NIAGARA

HUMIDIFYING • AIR ENGINEERING EQUIPMENT

Open-Hearth Steelmaking

(*Concluded from Page* 126)

scrap. The biggest percentage of this tonnage, together with the tonnage in wrecked buildings, bridges, railroads, etc., is either in Europe or Asia.

Second: That a major percentage of this potential scrap supply is the property of the United States government.

Third: That the preparation, segregation, transportation to and loading on American boats offer practical means of reversing lend-lease commitments, or that the price of this scrap in American ports would amount only to the cost of freight plus the price fixed by the United States. The prewar freight rate (1936) from England to the United States was 22 shillings 6 pence per gross ton, or a little more than $5 per gross ton, and this rate, according to the U. S. Department of Commerce, would have been considerably lower had there been a greater movement of this commodity.

It should be observed that the scrap price thus stipulated would also govern the price in the domestic market. For this reason, the price-fixing policy of the government covering the foreign scrap must be made in the light of this relationship as well as in the light of the production costs of pig iron. In other words, the established price must be low enough to be within a proper range of the costs of pig iron, and high enough to cover the base price plus the costs of collection, processing, loading and transportation, plus the profit regarding domestic prices. This can be accomplished on one hand by regulation of the base price, not by the government but by the scrap industry in conjunction with the government, according to policies dealing with the movement of scrap, and on the other by the fact that this setup would totally eliminate speculation in scrap.

All of these potentialities would make possible a stable and sound scrap price relative to the costs of pig iron, which means an entirely new basis for the open-hearth process. On this new foundation, the development of the mechanical phase is destined to enter a new era of progress.

Film on Swaging Also Has Foreign Narration

"Swaging", a 16 mm motion picture film, now is available without charge to educational, employer and employe groups throughout the world from Standard Machinery Co., Providence, R. I. With sound commentary in English, French, Russian, and Spanish, it gives a Hollywood style portrayal of many applications of the swaging process in production methods for pointing, shaping, and attaching fittings to bar, cable, and tube. Film features one-operation, fast, precision, and no scrap-forming type of manufacture. Steel—including stainless—copper, aluminum, and wood products are shown to be included within processing scope of swager and its derivatives.

Precision Forging Press

(*Concluded from Page* 128)

"spring" is reduced to a minimum, a high degree of alignment is maintained. Die detail is sharp. In many cases, parts are held to such close tolerances that they can be finished by sand blasting, pickling, or semi-hot and cold coining.

Elimination of impact permits dies such as the one shown in Fig. 2 to be made from high quality heat resisting steel without danger of excessive breakage. Dies also can be thin sections much lighter in weight than impact forging dies, with the result that they are easily heat treated, and first cost is less.

Simple Qualitative Test Detects Uranium Quickly

Uranium, the source of the atomic bomb's tremendous power, can be detected readily in low-grade complex uranium-vanadium ores by a relatively simple and speedy qualitative test developed and used successfully for over 2 years by the Bureau of Mines. It is said to be ideal for testing ore samples prior to quantitative analyses, the process wasting none of the sample, permitting prompt rejection of samples proved to contain no uranium, and providing a corroborating test to be applied to establish definitely the presence or absence of uranium.

Based on the known fact that certain uranium salts fluoresce under ultra-violet light and certain solutions of uranium salts also fluoresce under proper conditions, process utilizing short-wave ultraviolet light has provided a rapid, positive method for uranium determinations and has saved many laboratory hours in uranium-vanadium ore analyses.

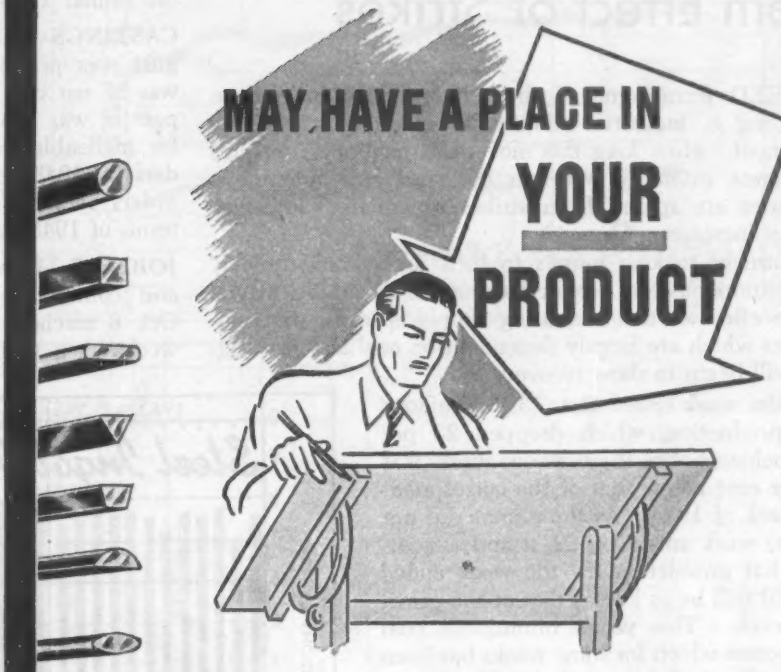
Ore is dissolved in a chemical solution in a beaker. Beaker then is set on a flat, nonreflecting surface in a dark room and ultraviolet light placed on the open top. If ore contains uranium, a bright greenish-yellow light is seen when viewed from a certain angle. This test is described as sensitive enough to indicate amounts of uranium that ordinarily would be detected in the most precise chemical methods, yet is not so sensitive as to give positive reactions with mere traces of uranium. Process also has been found applicable for detecting uranium in columbium-tantalum ores.

A copy of Report of Investigations 7337, "Fluorescence Test for Uranium," by Claude W. Sill and H. E. Peterson, may be obtained from Bureau of Mines, Department of the Interior, Washington 25, D. C.

Lead Welding Classes

Classes offering instruction in the skilled craft of lead welding are being set up in many cities by plumbers local unions. In some cities experienced lead welders are available and successful teaching programs easily established, but in others it is necessary to have training classes for teachers.

PAGE *Stainless Steel* WIRE



PAGE stainless steel wire—round, flat or specially shaped—is today being used in fabricating hundreds of products which seem wholly unrelated to wire. New uses are constantly being found. And where wire is so used, it is effecting production short-cuts—reducing production costs.

From long experience, PAGE is often able to advise about applications—as well as supply the wire.

While specializing in stainless steel, PAGE also draws wire of high or low carbon steel, Armco ingot iron and special alloys. Shaped wire in section areas to .250″ square—widths to ⅜″.

If there is a possibility of using wire in the making of your product, it will pay you to . . .

Get in touch with Page!

ACCO

Monessen, Pa., Atlanta, Chicago, Detroit, Denver, Los Angeles, New York, Pittsburgh, Portland, San Francisco, Bridgeport, Conn.

PAGE STEEL AND WIRE DIVISION
AMERICAN CHAIN & CABLE

THE BUSINESS TREND

Industry Begins Recovery From Effect of Strikes

FREED from some of the strikes which have been strangling it, industrial activity is beginning a recovery movement. How long this movement continues depends to a great extent on whether the steel and automobile industries are spared from strikes in unions' campaigns for pay increases.

Return of striking miners to their jobs should quickly raise bituminous coal production from its recent low marks. As the effect of this increasing supply spreads, other industries which are largely dependent on coal and its products will begin to show recovery too.

In the week ended Oct. 13, bituminous coal production, which dropped 23 per cent below that of the previous week, was 48 per cent below that of the corresponding week of 1944. As the miners did not resume work until Oct. 22, it appears certain that production for the week ended Oct. 20 will be as low as that of the previous week. This year's bituminous coal production which for some weeks has been approximately 7 per cent behind last year's is now 8.7 per cent behind.

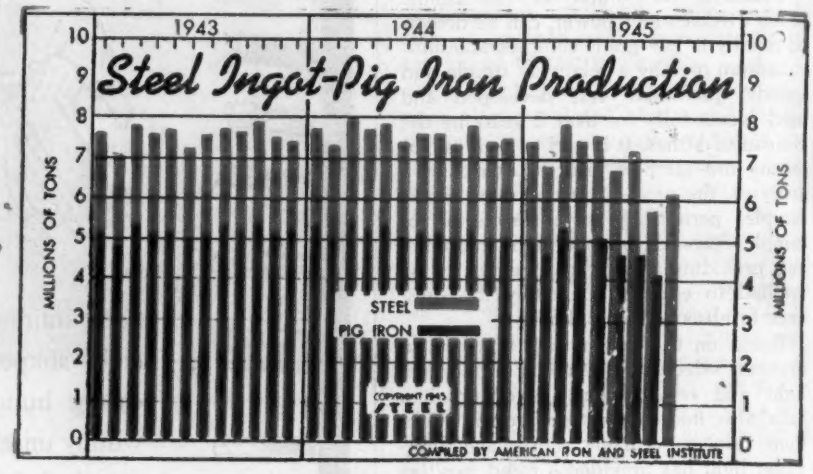
STEEL—Until coal supplies are replenished at steel plants, the steel ingot rate will hold steady for about two weeks at its current low rate and then turn upward.

AUTOMOBILES—The automobile industry which was hampered for several weeks largely by strikes in component suppliers' plants is now showing some progress in production. In the week ended Oct. 20, automobile output continued to rise slightly and reached 13,750 units, compared with 11,825 in the previous week.

CONSTRUCTION—Up for the fourth month, the value of building permits issued in September reached $121,266,520 for the 215 cities regularly reporting to Dun & Bradstreet Inc. This was the largest monthly total since August, 1944, and marked a 6.8 per cent gain over the previous month. Volume of building permits for the 215 cities for the first nine months of 1945 increased 26.9 per cent over the similar 1944 period.

CASTINGS—Malleable iron castings production in August was practically unchanged from that of July but was 27 per cent below that of August, 1944. Under impact of war contract terminations, cancellations of orders for malleable iron castings in August exceeded new orders by 13,029 tons. However, a substantial backlog of orders remains, sufficient for six-months' production in terms of 1945 average monthly output.

JOBLESS—Unemployment compensation claims (initial and continued) in the nation during the week ended Oct. 6 reached 1,707,900, highest weekly total since V-J week when they were only 326,500.



Iron, Steel Production
(Net tons—000 omitted)

	Steel Ingots			Pig Iron	
	1945	1944	1943	1945	1944
January	7,206	7,593	7,424	4,945	5,276
February	6,655	7,194	6,824	4,563	5,083
March	7,708	7,826	7,673	5,228	5,434
April	7,292	7,594	7,375	4,786	5,243
May	7,452	7,703	7,550	5,016	5,343
June	6,842	7,234	7,041	4,605	5,057
July	6,987	7,498	7,416	4,734	5,157
August	5,736	7,499	7,592	4,181	5,210
September	6,008	7,235	7,519	....	4,988
October	....	7,621	7,819	....	5,200
November	....	7,279	7,374	....	4,904
December	....	7,366	7,266	....	4,999
Total	....	89,642	88,873	....	61,894

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	63	73.5	83	96.5
Electric Power Distributed (million kilowatt hours)	3,915	3,934	4,019	4,345
Bituminous Coal Production (daily av.—1000 tons)	1,025	1,333	2,029	1,990
Petroleum Production (daily av.—1000 bbls.)	4,237	3,781	4,528	4,745
Construction Volume (ENR—Unit $1,000,000)	$73.1	$33.2	$55.2	$20.8
Automobile and Truck Output (Ward's—number units)	13,750	11,825	10,570	20,660

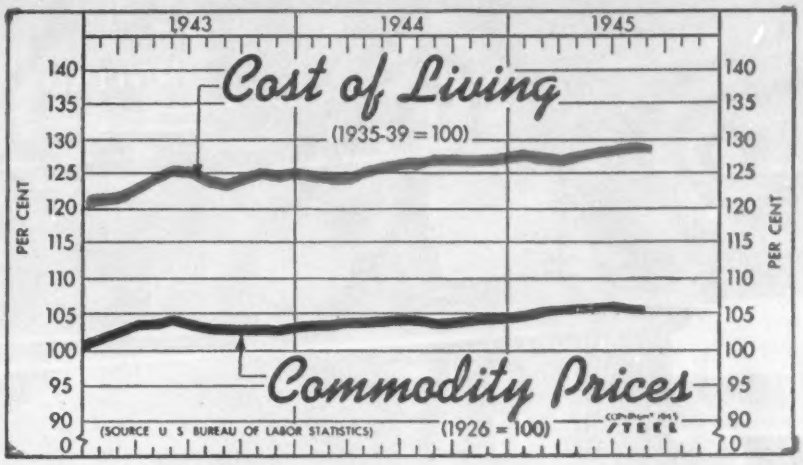
*Dates on request.

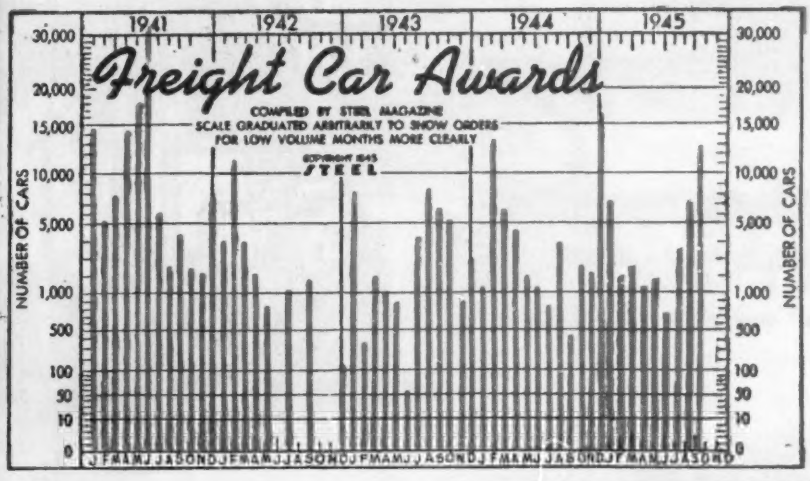
TRADE				
Freight Carloadings (unit—1000 cars)	773†	755	837	906
Business Failures (Dun & Bradstreet, number)	15	12	23	12
Money in Circulation (in millions of dollars)‡	$27,952	$27,962	$27,777	$24,157
Department Store Sales (change from like week a year ago)‡	+11%	+11%	+9%	+17%

†Preliminary. ‡Federal Reserve Board.

Wholesale Commodity Price—Cost of Living Indexes

	—Commodities— (1926=100)			—Living Cost— (1935-39=100)		
	1945	1944	1943	1945	1944	1943
Jan.	104.9	106.3	101.9	127.1	124.2	120.6
Feb.	105.2	103.6	102.5	126.9	123.8	120.9
Mar.	105.3	103.8	103.4	126.8	123.8	122.8
Apr.	105.7	103.9	103.7	127.1	124.6	124.1
May	106.0	104.0	104.1	128.1	125.1	125.1
June	106.1	104.3	103.8	129.0	125.4	124.8
July	105.9	104.1	103.2	129.4	126.1	123.8
Aug.	105.7	103.9	103.1	129.2	126.4	123.2
Sept.	....	104.0	103.1	....	126.5	123.9
Oct.	....	104.1	103.0	....	126.5	124.4
Nov.	....	104.4	102.9	....	126.6	124.1
Dec.	....	104.7	103.2	....	127.0	124.4
Ave.	....	104.0	103.2	....	125.5	123.5





Freight Car Awards

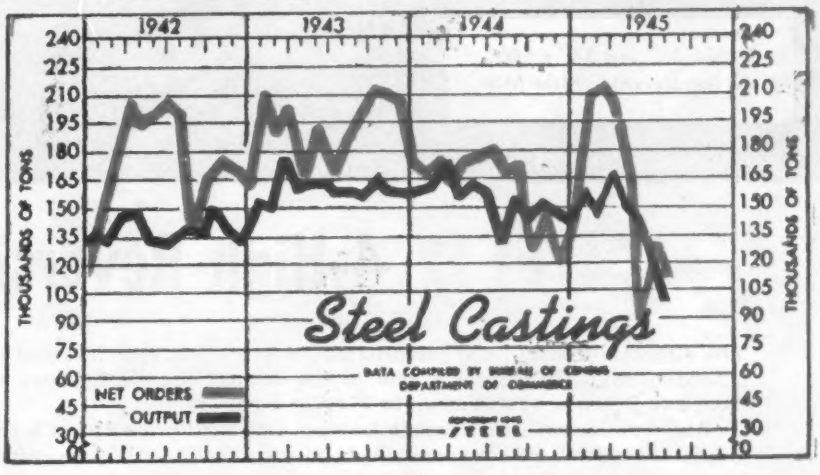
	1945	1944	1943	1942
Jan.	7,200	1,020	8,365	4,253
Feb.	1,750	13,240	350	11,725
March	2,500	6,510	1,935	4,080
April	1,120	4,519	1,000	2,125
May	1,526	1,952	870	822
June	670	1,150	50	0
July	3,500	795	4,190	1,025
Aug.	7,240	3,900	8,747	0
Sept.	12,840	400	6,829	1,863
Oct.	....	2,425	5,258	0
Nov.	....	1,065	870	0
Dec.	....	16,245	2,919	135
Total	....	53,221	41,374	26,028

Commercial Steel Castings†

(Net tons in thousands)

	Orders		Production	
	1945	1944	1945	1944
Jan.	210.2	167.7	157.2	159.8
Feb.	214.4	173.6	146.2	161.4
Mar.	203.2	162.6	166.9	174.6
Apr.	177.7	175.1	150.3	155.8
May	89.8	177.0	145.1	161.8
June	130.2	181.8	125.1	157.4
July	110.7	169.9	99.6	131.9
Aug.	....	171.3	....	154.9
Sept.	....	129.8	....	144.5
Oct.	....	146.1	....	150.7
Nov.	....	120.7	....	146.4
Dec.	....	138.7	....	144.2
Ave.	....	159.5	....	153.6

† For sale.



FINANCE

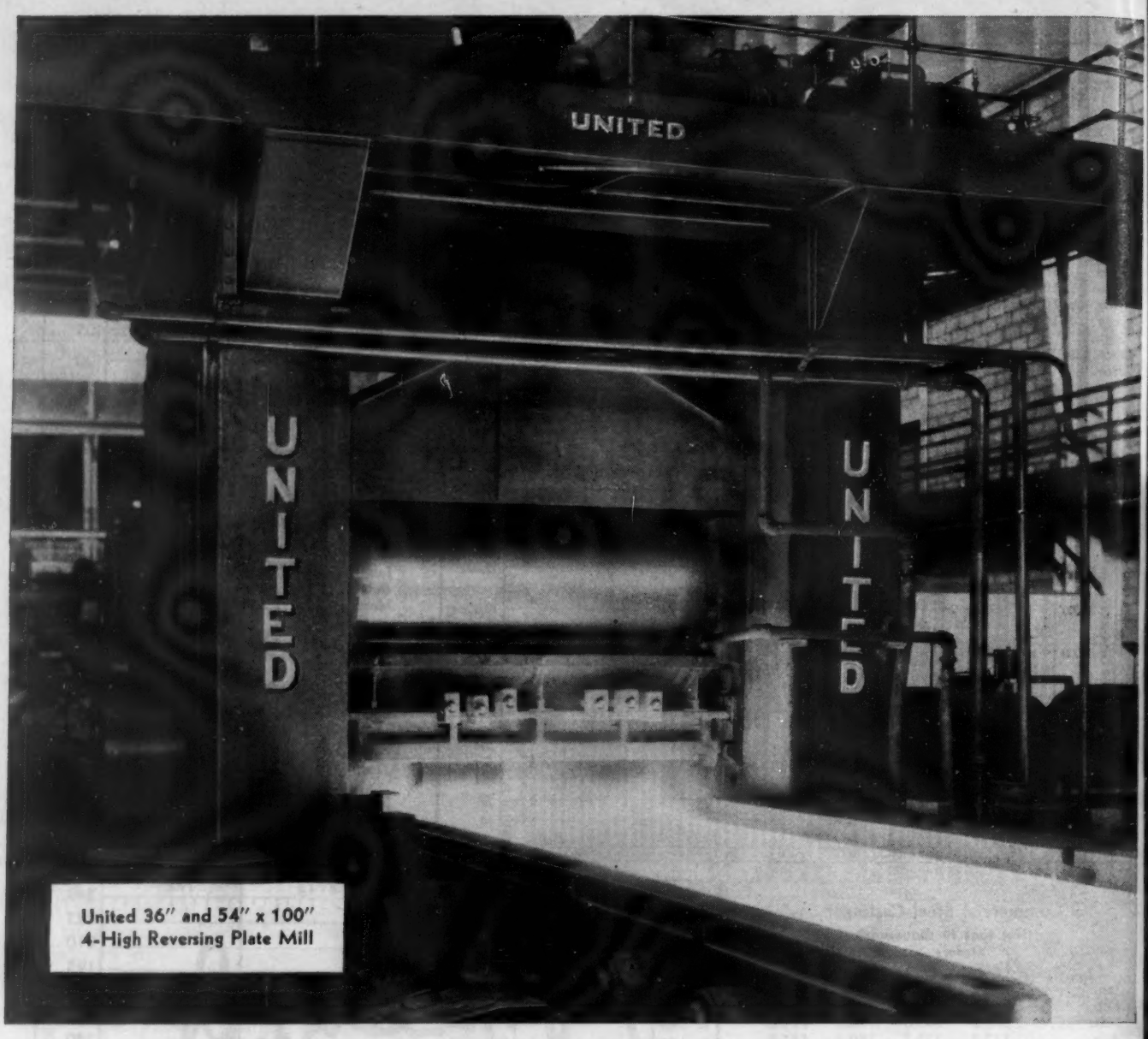
	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$10,072	$10,146	$11,446	$9,408
Federal Gross Debt (billions)	$262.1	$262.3	$262.6	$211.3
Bond Volume, NYSE (millions)	$39.3	$26.2	$30.1	$46.3
Stocks Sales, NYSE (thousands)	9,168	6,672	7,064	4,092
Loans and Investments (billions)†	$60.9	$61.0	$61.8	$54.1
United States Gov't. Obligations Held (millions)†	$45,108	$45,143	$45,823	$40,130

†Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$58.27	$58.27	$58.27	$56.73
All Commodities†	105.3	105.2	104.7	103.8
Industrial Raw Materials†	116.6	116.3	115.0	113.2
Manufactured Products†	101.9	101.8	101.8	101.2

†Bureau of Labor Statistics Index, 1926 = 100.



United 36" and 54" x 100"
4-High Reversing Plate Mill

UNITED 4-High Reversing Plate Mill

The 4-high reversing stand pictured above is the first ever installed in a tandem mill. It reduces a slab to the desired size for finishing in from 3 to 7 passes, at speeds up to 754 feet a minute.

Among numerous outstanding features embodied in its design is the electrical control mechanism which automatically makes required changes in roll settings for each pass, and reverts again to the initial setting for another cycle when the slab advances to the finishing train.

A system of roll balancing is employed that makes disconnection of hydraulic connections unnecessary when backup roll changes are required.

The "know-how" that built this mill is the result of many years progressive research and development in rolling mill design and construction. To the industry, we offer the advantages of that experience plus the manufacturing capacity of our 6 great plants.

The World's Largest Designers and Makers of Rolls and Rolling Mill Equipment

UNITED ENGINEERING AND FOUNDRY COMPANY

PITTSBURGH, PENNSYLVANIA

***Plants at* Pittsburgh • Vandergrift • New Castle • Youngstown • Canton**

Subsidiary: Adamson United Company, Akron, Ohio

Affiliates: Davy and United Engineering Company, Ltd., Sheffield, England

Dominion Engineering Works, Ltd., Montreal, P. Q. Canada

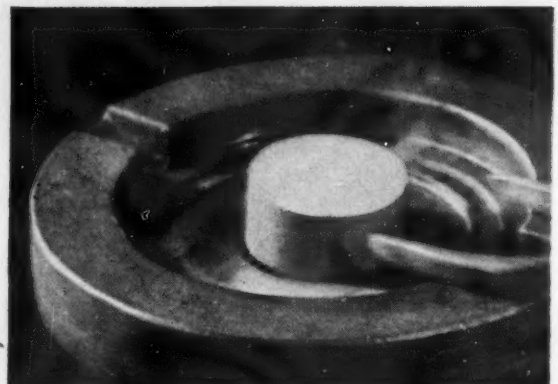
Anaconda HOT PRESSED FORGINGS
made by The American Brass Company

Illustrating the almost unlimited design possibilities in producing complicated or intricate parts of wrought Copper, Brass, Bronze or Special Copper Alloys. Additional information regarding this product appears on the following page.

Machined samples through courtesy of customers.

Here's how Anaconda Hot Pressed Forgings are made

1
a heated copper-alloy blank is centered in the die . . .



2
the dies close—with hundreds of tons of pressure . . .

3
and presto! — the metal is wrought into a semi-finished shape.

Of course, it isn't quite that simple. There are such matters as alloy composition, forging temperature, die design, trimming, piercing or sizing — but these are problems that we take care of.

and here's how they improve the product, reduce the cost

Anaconda Hot Pressed Forgings have twice the strength of sand castings—without the sand that causes needless tool wear. Absence of internal defects and a uniform, dense grain structure make them gas, air and watertight—able to withstand high pressures. Consistently accurate in dimension, they have a smooth, fine-textured surface and machine readily. Available in Copper, Brass, Bronze and Special Copper Alloys.

For typical examples of Anaconda Hot Pressed Forgings, see the preceding page. Inquiries regarding specific metallurgical, design, cost or production information will be given prompt attention. 45161

THE AMERICAN BRASS COMPANY

General Offices: Waterbury 88, Connecticut
Subsidiary of Anaconda Copper Mining Company
In Canada: ANACONDA AMERICAN BRASS LTD., *New Toronto, Ont.*

ANACONDA

Anaconda Hot Pressed Forgings

Steel Buyers Continue To Press for More Tonnage

Quotas being set by mills to aid equitable distribution . . . Production suffers effects of coal strike . . . Pig iron price advanced

WITH scarcely a start made toward meeting heavy postwar demands, steel consumers continue active in efforts to place steel, notwithstanding labor unrest and prospects of still greater disturbance before improvement comes.

In general it is expected the next several weeks may see a turn for the better, with formulation of a general wage policy. Potential needs are so urgent and large and buying power so great steel buyers feel industry must go ahead when difficulties are ironed out. Were conditions not so unsettled steel buying probably would be still greater and while producers of many products are swamped as it is, ingot production probably would be 25 to 30 points higher and with far more orderly and uniform outlook than now exists.

The industry is recovering slowly from the recent coal strike but its effects will be felt for some time. A combination of recent operating difficulties, continued unsettled labor outlook and active demand is forcing producers to turn more and more to the necessity of rationing. Greatest stress is on sheets and strip but rationing is being applied increasingly to all major products, except plates and alloy steels. One large steelmaker now has practically all his products on such a basis, effective for the most part as of the first of next year. Except for merchant pipe, set up on a monthly basis, quotas generally are on a quarterly basis. Another producer is applying quotas to narrow strip, setting them up for third quarter of next year, the most extended action of this sort yet reported.

Where mills have not established a formal basis of rationing their acceptance of business is highly selective. In some cases, involving light flat products in particular, some producers continue virtually out of the market for the present.

Estimated steelmaking rate for last week held unchanged at 65 per cent of capacity as the decline because of the coal strike was halted, though conditions were not improved sufficiently to allow production to increase. Pittsburgh advanced ½-point to 49½ per cent, Detroit 4 points to 88, Buffalo 9 points to 69½, Cleveland ½-point to 81 and New England 1 point to 80. Chicago dropped 1 point to 72, Wheeling 3½ points to 60½ and Youngstown 2 to 45. Rates were unchanged as follows: Cincinnati 71, eastern Pennsylvania 71, St. Louis 68 and Birmingham 95.

Office of Price Administration last week announced an advance of 75 cents per ton on all grades of pig iron except charcoal, to compensate for increased costs from higher coke prices and wages. This is the second advance since prices were frozen in June, 1941, an additional dollar having been allowed Feb. 14, this year. This action may result in larger production by allowing some idle furnaces to resume with prospect of profit in cases where costs were high.

As expected, following establishment of additional basing points on stainless steel products similar action has been taken by some tool steel producers. This is in line with efforts to comply with the spirit of the Supreme Court decision on basing points some time ago.

The Secondary Steel Products Industry Advisory Committee has recommended to OPA that relief be given from absorption of price increases on primary steel products. It suggests that since it is informed steel prices will be advanced soon it should be allowed to pass such increases along to buyers and also be relieved of former advances which have been absorbed.

Scrap continues in short supply and prices are strong at ceilings, demand increasing as pig iron supply falls short, as a result of the coal strike.

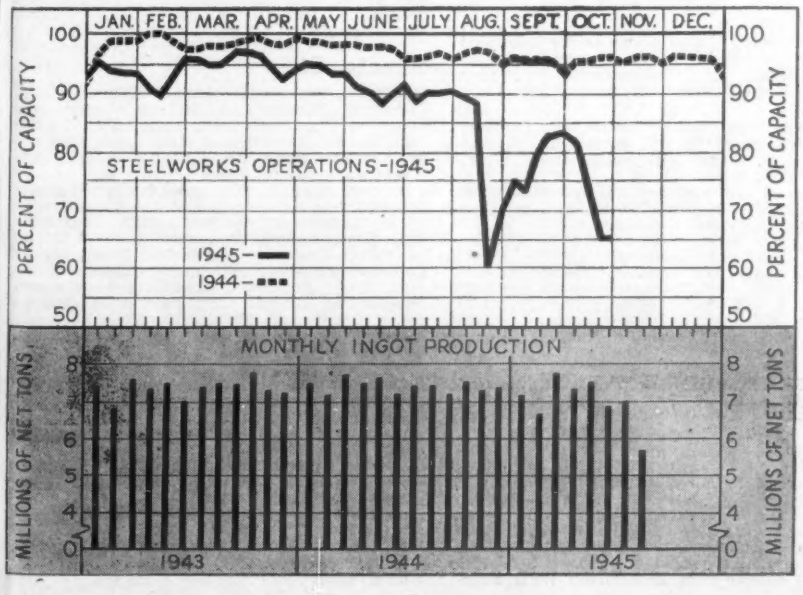
Average composite prices of steel and iron products are unchanged, except for steelmaking pig iron, which has advanced 75 cents per ton to $24.80 as OPA allowed an increase of that amount. Finished steel composite remains at $58.27, semifinished steel at $37.80 and steelmaking scrap at $19.17.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended Oct. 27	Change	Same Week 1944	Same Week 1943
Pittsburgh	49.5	+0.5	92	101
Chicago	72	—1	98.5	101
Eastern Pa.	71	None	94.5	95
Youngstown	45	—2	88	98
Wheeling	80.5	—3.5	97	98
Cleveland	81	+0.5	95.5	90.5
Buffalo	69.5	+9	80	90.5
Birmingham	95	None	90	67
New England	80	+1	83	95
Cincinnati	71	None	84	91
St. Louis	68	None	75	90.5
Detroit	88	+4	86	88
Estimated national rate	65	None	96.5	99.5

*Based on steelmaking capacities as of these dates.



COMPOSITE MARKET AVERAGES

	Oct. 27	Oct. 20	Oct. 13	One Month Ago Sept., 1945	Three Months Ago July, 1945	One Year Ago Oct., 1944	Five Years Ago Oct., 1940
Finished Steel	$58.27	$58.27	$58.27	$58.27	$58.27	$56.73	$56.73
Semifinished Steel	37.80	37.80	37.80	37.80	37.80	36.00	36.00
Steelmaking Pig Iron	24.80	24.05	24.05	24.05	24.05	23.05	22.05
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	16.50	20.20

Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania. Finished steel, net tons; other, gross tons.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for last Month, Three Months and One Year Ago

Finished Material

	Oct. 27, 1945	Sept., 1945	July, 1945	Oct., 1944
Steel bars, Pittsburgh	2.25c	2.25c	2.25c	2.15c
Steel bars, Philadelphia	2.57	2.57	2.57	2.47
Steel bars, Chicago	2.25	2.25	2.25	2.15
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.25	2.25	2.25	2.10
Plates, Philadelphia	2.30	2.30	2.30	2.15
Plates, Chicago	2.25	2.25	2.25	2.10
Sheets, hot-rolled, Pittsburgh	2.20	2.20	2.20	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.70	3.70	3.70	3.50
Sheets, hot-rolled, Gary	2.20	2.20	2.20	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.70	3.70	3.70	3.50
Bright bess., basic wire, Pittsburgh	2.75	2.75	2.75	2.60
Tin plate, per base box, Pittsburgh	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.90	2.90	2.90	2.55

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$36.00	$36.00	$36.00	$34.00
Slabs, Pittsburgh, Chicago	36.00	36.00	36.00	34.00
Rerolling billets, Pittsburgh	36.00	36.00	36.00	34.00
Wire rods, No. 5 to ⅜-inch, Pitts.	2.15	2.15	2.15	2.00

Pig Iron

	Oct. 27, 1945	Sept., 1945	July, 1945	Oct., 1944
Bessemer, del. Pittsburgh	$26.94	$26.19	$26.19	$25.19
Basic, Valley	25.25	24.50	24.50	23.50
Basic, eastern del. Philadelphia	27.09	26.34	26.34	25.34
No. 2 fdry., del. Pitts., N.&S. Sides	26.44	25.69	25.69	24.69
No. 2 foundry, Chicago	25.75	25.00	25.00	24.00
Southern No. 2, Birmingham	22.13	21.38	21.38	20.38
Southern No. 2 del. Cincinnati	26.05	25.30	25.30	24.30
No. 2 fdry., del. Philadelphia	27.59	26.84	26.84	25.84
Malleable, Valley	25.75	25.00	25.00	24.00
Malleable, Chicago	25.75	25.00	25.00	24.00
Lake Sup., charcoal del. Chicago	37.34	37.34	37.34	37.34
Gray forge, del. Pittsburgh	25.94	25.19	25.19	24.19
Ferromanganese, del. Pittsburgh	140.00	140.33	140.33	140.33

Scrap

Heavy melting steel, No. 1 Pittsburgh	$20.00	$20.00	$20.00	$16.95
Heavy melt. steel, No. 2, E. Pa.	18.75	18.75	18.45	14.50
Heavy melting steel, Chicago	18.75	18.75	18.75	17.50
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00	20.00

Coke

Connellsville, furnace, ovens	$7.50	$7.50	$7.50	$7.00
Connellsville, foundry ovens	8.25	8.25	8.25	7.75
Chicago, by-product fdry., del.	13.35	13.75	13.35	13.35

STEEL, IRON RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941, Feb. 4, 1942 and May 21, 1945. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold-rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal established basing points for selected products are named specifically. Seconds and off-grade products are also covered. Exceptions applying to individual companies are noted in the table. Finished steel quoted in cents per pound.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00. (Empire Sheet & Tin Plate Co., Mansfield, O. may quote carbon steel ingots at $33 gross ton, f.o.b. mill Kaiser Co. Inc., $43, f.o.b. Pacific ports.)

Alloy Steel Ingots: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon; uncrop, $45. **Rerolling Billets, Blooms, Slabs:** Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $36; Detroit, del. $38; Duluth (bil) $38; Pac. Ports, (bil) $48. (Andrews Steel Co., carbon slabs $41; Continental Steel Corp., billets $34, Kokomo, to Acme Steel Co.; Northwestern Steel & Wire Co., $41, Sterling, Ill; Laclede Steel Co., $34 Alton or Madison, Ill.; Wheeling Steel Corp. $36 base, billets for lend-lease, $34, Portsmouth, O., on slabs on WPB directives. Granite City Steel Co. $47.50 gross ton slabs from D.P.C. mill. Geneva Steel Co., Kaiser Co. Inc., $58.64, Pac. ports.)

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $42. Detroit, del. $44; Duluth, billets, $44; forg. bil. f.o.b. Pac. ports, $54. (Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points; Follansbee Steel Corp., $49.50 f.o.b. Toronto, O. Geneva Steel Co., Kaiser Co. Inc., $64.64, Pacific ports.)

Open Hearth Shell Steel: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Youngstown, Birmingham, base 1000 tons one size and section; 3-12 in., $52; 12-18 in., excl., $54.00; 18-in. and over $56. Add $2.00 del. Detroit; $3.00 del. Eastern Mich. (Kaiser Co. Inc., $76.64, f.o.b. Los Angeles.)

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54, del. Detroit $56, Eastern Mich. $57.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $36. (Wheeling Steel Corp. $37 on lend-lease sheet bars, $38 Portsmouth, O., on WPB directives; Empire Sheet & Tin Plate Co., Mansfield, O., carbon sheet bars, $39, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Point, Youngstown, Coatesville, lb., 1.90c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, 5—⅜ in. inclusive, per 100 lbs., $2.15 Do., over ⅜—$\frac{7}{16}$-in., incl., $2.30; Galveston, base, 2.25c and 2.40c, respectively. Worcester add $0.10; Pacific ports $0.50 (Pittsburgh Steel Co., $0.20 higher.)

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham base 20 tons one size, 2.25c; Duluth, base 2.35c; Youngstown, base, 2.275c; Detroit, del. 2.35c; Eastern Mich. 2.40c; New York del. 2.59c; Phila. del. 2.57c; Gulf Ports, dock 2.62c; Pac. ports, dock 2.90c. (Calumet Steel Division. Borg-Warner Corp., and Joslyn Mfg. & Supply Co., may quote 2.35c, Chicago base; Sheffield Steel Corp., 2.75c, f.o.b. St. Louis.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons. (Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.)

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c; Youngstown, base, 2.725c; Detroit, del., 2.80c.

(Texas Steel Co. may use Chicago base price as maximum f.o.b. Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(•Basic O-H)	AISI Series	(•Basic O-H)
1300	$0.10	4100 (.15-.25 Mo)	0.70
		(.20-.30 Mo)	0.75
2300	1.70	4300	1.70
2500	2.55	4600	1.20
3000	0.50	4800	2.15
3100	0.85	5100	0.35
3200	1.35	5130 or 5152	0.45
3400	3.20	6120 or 6152	0.95
4000	0.45-0.55	6145 or 6150	1.20

•Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.75c; Detroit 2.80c; Toledo 2.90c. (Keystone Drawn Steel Co. may sell outside its usual market area on Proc. Div., Treasury Dept. contracts at 2.65c, Spring City, Pa., plus freight on hot-rolled bars from Pittsburgh to Spring City, New England Drawn Steel Co. may sell outside New England on WPB directives at 2.65c, Mansfield, Mass., plus freight on hot-rolled bars from Buffalo to Mansfield.)

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit, del. 3.45c; Eastern Mich. 3.50c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c; Pacific ports, dock 2.55c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo base 2.15c; Detroit, del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c.

Iron Bars: Single refined, Pitts. 4.40c; double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, single ref., 5.00, double ref., 6.25c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.20c; Granite City, base 2.30c; Detroit del. 2.30c; Eastern Mich. 2.35c; Phila. del. 2.37c; New York del. 2.44c; Pacific ports 2.75c.

(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O., base; Alan Wood Steel Co., Conshohocken, Pa., may quote 2.35c on hot carbon sheets, nearest eastern basing point.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.15c; Eastern Mich. 3.20c; New York del. 3.39c; Phila. del. 3.37c; Pacific ports 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.70c; Granite City, base 3.80c; New York del. 3.94c; Phila. del. 3.78c; Pacific ports 4.25c. (Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.36c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage not corrugated, copper alloy 3.60c; Granite City 3.70c; Pacific ports 4.25c; copper iron, 3.90c; pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh, 4.25c.

Enameling Sheets: 10-gage; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base 2.85c; Granite City, base 2.95c; Detroit, del. 2.95c; eastern, Mich. 3.00c; Pacific ports 3.50c; 20-gage; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base 3.45c; Detroit del. 3.55c; eastern Mich. 3.60c; Pacific ports 4.10c.

Electrical Sheets No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.30c	4.05c	3.30c
Armature	3.65c	4.40c	3.75c
Electrical	4.15c	4.90c	4.25c
Motor	5.05c	5.80c	5.15c
Dynamo	5.75c	6.50c	5.85c
Transformer			
72	6.25c	7.00c	....
65	7.25c	8.00c	....
58	7.75c	8.50c	....
52	8.55c	9.30c	....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base 1 ton and over, 12 inches wide and less 2.10c; Detroit del. 2.20c; Eastern Mich. 2.25c; Pacific ports 2.75c

Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.90c; Eastern Mich. 2.95c; Worcester base 3.00c.

Commodity C. R. Strip: Pittsburgh, Cleveland Youngstown, base 3 tons and over, 2.95c; Chicago 3.05c; Detroit del. 3.05c; Eastern Mich. 3.10c; Worcester base 3.25c.

Cold Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.

Electrolytic Tin Plate: Pittsburgh, Gary, 100-lb. base box, 0.25 lb. tin, $4.35; 0.50 lb. tin, $4.50; 0.75 lb. tin $4.65; Granite City, $4.45, $4.60, $4.75, respectively

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed, 4.05c.

Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c; Pacific ports 4.55c.

Manufacturing Ternes: (Special Coated) Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.

Roofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I.C. 8-lb. $12.00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.25c; New York, del. 2.44c; Phila., del. 2.30c; St. Louis, 2.49c; Boston, del. 2.57-82c; Pacific ports, 2.80c; Gulf ports, 2.60c.

(Granite City Steel Co. may quote carbon plates 2.35c f.o.b. mill; 2.65c f.o.b. D.P.C. mill; Kaiser Co. Inc., 3.20c, f.o.b. Los Angeles. Central Iron & Steel Co. 2.50c f.o.b. basing points; Geneva Steel Co., Provo, Utah, 3.20c, f.o.b. Pac. ports.)

Floor Plates: Pittsburgh, Chicago, 3.50c; Pacific ports, 4.15c; Gulf ports, 3.85c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c; Gulf ports 3.95c; Pacific ports 4.15c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del. 2.27c; Phila., del. 2.215c; Pacific ports, 2.75c; Gulf ports, 2.45c.

Piling

Pittsburgh, Chicago, Buffalo 2.40; Pacific ports, 2.95c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham to manufacturers in carloads.

Bright basic, bessemer wire *2.75c
Spring wire ..... *†3.35c

Wire Products to the Trade:

Standard and cement-coated wire nails, and staples, 100-lb. keg, Pittsburgh, Chicago, Birmingham, Cleveland, $2.90; Pac. ports, $3.40; galvanized, $2.55 and $3.05, resp.

Annealed Merchant quality wire, 100-lb., Pittsburgh, Chicago, Cleveland, Birmingham ..... ††$3.20

Galvanized Merchant quality wire, 100-lb., Pittsburgh, Chicago, Cleveland, Birmingham ..... ††$3.55

Woven fence, 15½ gage and heavier, per base column 67

Barbed wire, 80-rod spool, Pittsburgh, Chicago, Cleveland, Birmingham, column 72; twisted barbless wire, column 72.

*Pittsburgh Steel Co., 0.20c higher; add 2 cents for Worcester, 1 cent for Duluth; add ½-cent for bright, annealed or galvanized and 7/10-cent for other finishes for Pacific ports.

†Same bases as for bright basic except Birmingham.

††Add 10 cents for Worcester; 50 cents for annealed, bright basic and 70 cents for all other finishes for Pacific ports.

Tubular Goods

Welded Pipe: Base price in carloads, threaded and coupled to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld

Steel In.	Blk.	Galv.	Iron In.	Blk.	Galv.
⅛	56	33	½	24	3½
¼ & ⅜	59	40½	⅝	30	10
½	63½	51	¾	34	16
¾	66½	55	1-1¼	38	18½
1-3	68½	57½	2	37½	18

Lap Weld

Steel In.	Blk.	Galv.	Iron In.	Blk.	Galv.
2	61	49½	1¼	23	3½
2½-3	64	54½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½-3½	31½	14½
9-10	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O.D Sizes	B.W.G	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	$ 7.82	$ 9.01	....	....
1¼"	13	9.26	10.67	....	....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2¼"	12	16.01	18.45	15.16	....
2½"	12	17.54	20.21	16.58	26.57
2¾"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $43.00. Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $45.00.

*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $31-$33.

Supplies: Track bolts, 4.75c; heat treated, 5.00c. Tie plates $46 net ton, base, Standard spikes, 3.25c.

*Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, Canton, O., Dunkirk, N. Y., base, cents per lb.; Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.

Tung.	Chr.	Van.	Moly.	Base, per lb.
18.00	4	1	...	67.00c
1.5	4	1	8.5	54.00c
....	4	2	8	54.00c
6.40	4.15	1.90	5	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
CHROMIUM NICKEL STEEL					
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	....	....
*316	40.00	44.00	48.00	40.00	48.00
†321	29.00	34.00	41.00	29.25	38.00
‡347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50
STRAIGHT CHROMIUM STEEL					
403	21.50	24.50	29.50	21.25	27.00
**410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
††430F	19.50	22.50	29.50	18.75	24.50
440A	24.00	28.50	33.50	23.75	36.50
442	22.50	25.50	32.50	24.00	32.00
443	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00
STAINLESS CLAD STEEL (20%)					
304	....	§§18.00	19.00	....	....

*With 2-3% moly. ‡With titanium. †With columbium. **Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago Birmingham

Structural 3.75c
⅞- inch and under ..... 65-5 off
Wrought, Washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l. ..... $2.75 3.00 off

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%

Carriage and Machine

½ x 6 and smaller ..... 63½ off
Do., ⅝ and ⅞ x 6-in. and shorter .. 63½ off
Do., ¾ to 1 x 6-in. and shorter ..... 61 off
1⅛ and larger, all lengths ..... 59 off
All diameters, over 6-in. long ..... 59 off
Tire bolts ..... 50 off
Step bolts ..... 56 off
Plow bolts ..... 65 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Nuts

Semifinished hex	U.S.S.	S.A.E.
⅞-inch and less	62	64
1-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger	56	....

Hexagon Cap Screws

Upset 1-in., smaller ..... 64 off
Milled 1-in., smaller ..... 60 off

Square Head Set Screws

Upset, 1-in., smaller ..... 71 off
Headless, ¼-in., larger ..... 60 off
No. 10, smaller ..... 70 off

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.

Extras mean additions or deductions from base prices in effect April 16, 1941.

Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price plus all-rail freight may be charged.

Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price.

Seconds, maximum prices: flat-rolled rejects 75% of prime prices, wasters 75%, waste-wasters 65% except plates, which take waster prices; tin plate $2.80 per 100 lbs.; terne plate $2.25; semifinished 85% of primes; other grades limited to new material ceilings.

Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941.

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	*7.50
Connellsville, foundry	8.00- 8.50
New River, foundry	9.00- 9.25
Wise county, foundry	7.75- 8.25
Wise county, furnace	7.25- 7.75

By-Product Foundry

Kearney, N. J., ovens	13.05
Chicago, outside delivered	13.00
Chicago, delivered	13.75
Terre Haute, delivered	13.50
Milwaukee, ovens	13.75
New England, delivered	14.65
St. Louis, delivered	†13.75
Birmingham, delivered	10.90
Indianapolis, delivered	13.50
Cincinnati, delivered	13.25
Cleveland, delivered	13.20
Buffalo, delivered	13.40
Detroit, delivered	13.75
Philadelphia, delivered	13.28

*Operators of hand-drawn ovens using trucked coal may charge $8.00; effective May 26, 1945.

†14.25 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	15.00c
Toluol, two degree	28.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c
Per lb. f.o.b. works	
Phenol (car lots, returnable drums)	12.50c
Do., less than car lots	13.25c
Do., tank cars	11.50c
Eastern Plants, per lb.	
Naphthalene flakes, balls, bbls., to jobbers	8.00c
Per ton, bulk, f.o.b. port	
Sulphate of ammonia	$29.20

WAREHOUSE STEEL PRICES

Base delivered price, cents per pound, for delivery within switching limits, subject to established extras.

	Hot rolled bars	Structural shapes	Plates	Floor plates	Hot rolled sheets (10 gage base)	Hot rolled bands (12 gage and heavier)	Hot rolled hoops (14 gage and lighter)	Galvanized flat sheets (24 gage base)	Cold-rolled sheets (17 gage base)	Cold finished bars	Cold-rolled strip	NE hot bars 8600 series	NE hot bars 9400 series
Boston	4.044[1]	3.912[1]	3.912[1]	5.727[1]	3.774[1]	4.106[1]	5.106[1]	5.224[14]	4.744[14]	4.244[21]	4.715	6.012[23]	6.012[23]
New York	3.853[1]	3.758[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[13]	4.613[14]	4.203[21]	4.774	.....	.....
Jersey City	3.853[1]	3.747[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[13]	4.613[14]	4.203[21]	4.774	.....	.....
Philadelphia	3.822[1]	3.666[1]	3.605[1]	5.272[1]	3.518[1]	3.922[1]	4.272[1]	5.018[15]	4.872[25]	4.172[21]	4.772	5.816[23]	5.860[23]
Baltimore	3.802[1]	3.759[1]	3.594[1]	5.252[1]	3.394[1]	3.902[1]	4.252[1]	4.894[1]	4.852[25]	4.152[21]	.....	.....	.....
Washington	3.941[1]	3.930[1]	3.796[1]	5.341[1]	3.596[1]	4.041[1]	4.391[1]	5.196[17]	4.841[20]	4.141[21]	.....	.....	.....
Norfolk, Va.	4.065[1]	4.002[1]	3.971[1]	5.465[1]	3.771[1]	4.165[1]	4.515[1]	5.371[17]	4.965[24]	4.265[21]	.....	.....	.....
Bethlehem, Pa.*	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Claymont, Del*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Coatesville, Pa.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Buffalo (city)	3.35[1]	3.40[1]	3.63[1]	5.26[1]	3.35[1]	3.819[1]	3.819[1]	4.75[15]	4.40[10]	3.85[21]	4.669	5.60[23]	5.75[23]
Buffalo (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.81[1]	3.50[1]	4.65[15]	4.30[10]	3.75[21]	4.35	5.60[23]	5.75[23]
Pittsburgh (city)	3.35[1]	3.40[1]	3.40[1]	5.00[1]	3.35[1]	3.60[1]	3.60[1]	4.75[15]	4.40[24]	3.85[21]	.....	.....	.....
Pittsburgh (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.50[1]	3.50[1]	4.65[15]	4.30[24]	3.75[21]	.....	.....	.....
Cleveland (city)	3.35[1]	3.588[1]	3.40[1]	5.188[1]	3.35[1]	3.60[1]	3.60[1]	4.877[13]	4.40[24]	3.85[21]	4.45[21]	5.60[23]	5.65[23]
Cleveland (country)	3.25[1]	.....	3.30[1]	.....	3.25[1]	3.50[1]	3.50[1]	.....	4.30[24]	3.75[21]	4.35[21]	.....	.....
Detroit	3.450[1]	3.661[1]	3.609[1]	5.281[1]	3.450[1]	3.700[1]	3.700[1]	5.000[13]	4.500[24]	3.900[21]	4.659	5.93[23]	5.93[23]
Omaha (city, delivered)	4.115[1]	4.165[1]	4.165[1]	5.765[1]	3.865[1]	4.215[1]	4.215[1]	5.608[19]	5.443[24]	4.543[13]	.....	.....	.....
Omaha (country, base)	4.015[1]	4.065[1]	4.065[1]	5.665[1]	3.765[1]	4.115[1]	4.115[1]	5.508[19]	.....	.....	.....	.....	.....
Cincinnati	3.611[1]	3.691[1]	3.661[1]	5.291[1]	3.425[1]	3.675[1]	3.675[1]	4.825[12]	4.475[24]	4.111[21]	4.711	6.10	6.20
Youngstown, O.*	.....	.....	.....	.....	.....	.....	.....	4.40[12]	.....	.....	.....	.....	.....
Middletown, O.*	.....	.....	.....	.....	3.25[1]	3.50[1]	3.50[1]	4.65[16]	.....	.....	.....	.....	.....
Chicago (city)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.25[1]	3.60[1]	3.60[1]	5.231[15]	4.20[24]	3.85[21]	4.65	5.75[23]	5.85[23]
Milwaukee	3.637[1]	3.687[1]	3.687[1]	5.287[1]	3.387[1]	3.737[1]	3.737[1]	5.272[15]	4.337[24]	3.987[21]	4.787	5.987[23]	6.087[23]
Indianapolis	3.58[1]	3.63[1]	3.63[1]	5.23[1]	3.518[1]	3.768[1]	3.768[1]	4.918[15]	4.568[24]	4.08[22]	4.78	6.08[23]	6.18[23]
St. Paul	3.76[2]	3.81[2]	3.81[2]	5.41[2]	3.51[2]	3.86[2]	3.86[2]	5.257[15]	4.46[24]	4.461[21]	5.102	6.09[23]	6.19[23]
St. Louis	3.647[1]	3.697[1]	3.697[1]	5.297[1]	3.397[1]	3.747[1]	3.747[11]	5.172[15]	4.347[24]	4.131[21]	4.931	6.131[23]	6.281[23]
Memphis, Tenn.	4.015[5]	4.065[5]	4.065[5]	5.78[5]	3.965[5]	4.215[5]	4.215[5]	5.265[15]	4.78[24]	4.43[21]	.....	.....	.....
Birmingham	3.50[1]	3.55[1]	3.55[1]	5.903[1]	3.45[1]	3.70[1]	3.70[1]	4.75[15]	4.852[24]	4.64	5.215	.....	.....
New Orleans (city)	4.10[4]	3.90[4]	3.90[4]	5.85[4]	4.058[4]	4.20[4]	4.20[4]	5.25[30]	5.079[10]	4.70[21]	5.429	.....	.....
Houston, Tex.	3.75[3]	4.25[3]	4.25[3]	5.50[3]	3.763[3]	4.313[3]	4.313[3]	5.313[30]	4.10[10]	3.75[22]	.....	.....	.....
Los Angeles	4.40[4]	4.65[4]	4.95[4]	7.20[4]	5.00[4]	4.95[4]	6.75[4]	6.00[13]	7.20[6]	5.683[22]	5.613	5.85[23]	5.95[23]
San Francisco	4.15[7]	4.35[7]	4.65[7]	6.35[7]	4.55[7]	4.50[7]	5.75[7]	6.35[15]	7.30[15]	5.433[21]	7.333	8.304[23]	8.404[23]
Portland, Oreg.	4.45[27]	4.45[27]	4.75[27]	6.50[27]	4.65[27]	4.75[27]	6.30[27]	5.75[15]	6.60[15]	5.633[15]	.....	.....	.....
Tacoma	4.35[9]	4.45[9]	4.75[9]	6.50[9]	4.65[9]	4.25[9]	5.45[9]	5.95[15]	7.60[15]	5.883[21]	.....	.....	8.00[23]
Seattle	4.35[9]	4.45[9]	4.75[9]	6.50[9]	4.65[9]	4.25[9]	5.45[9]	5.95[15]	7.05[15]	5.883[21]	.....	.....	8.00[23]

*Basing point cities with quotations representing mill prices, plus warehouse spread.
NOTE—All prices fixed by Office of Price Administration in Amendments Nos. 10 to 33 to Revised Price Schedule No. 49. Deliveries outside above cities computed in accordance with regulations.

BASE QUANTITIES

[1]400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 8999 pounds; [6]—300 to 9999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds; [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles; [19]—100 to 749 pounds; [20]—300 to 1999 pounds; [21]—1500 to 39,999 pounds; [22]—1500 to 1999 pounds; [24]—1000 to 39,999 pounds; [24]—400 to 1499 pounds; [25]—1000 to 1999 pounds; [26]—under 25 bundles. Cold-rolled strip, 2000 to 39,999 pounds, base; [27]— 300 to 4999 pounds.

Ores

Lake Superior Iron Ore

Gross ton, 51½% (Natural) Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56-63% contract	13.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	7.50-8.00

Tungsten Ore

Chinese Wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

(Equivalent OPA schedules):

Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Ore., or Tacoma, Wash.
(S S paying for discharge; dry basis, subject to penalties if guarantees are not met.)

Indian and African

48% 2.8:1	$41.00
48% 3:1	43.50
48% no ratio	31.00

South African (Transvaal)

44% no ratio	$27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80

Brazilian—nominal

44% 2.5:1 lump	33.65
48% 3:1 lump	43.50

Rhodesian

45% no ratio	28.30
48% no ratio	31.00
48% 3:1 lump	43.50

Domestic (seller's nearest rail)

48% 3:1 less $7 freight allowance	52.80

Manganese Ore

Sales prices of Metals Reserve Co., cents per gross ton unit, dry, 48%, at New York, Philadelphia, Baltimore, Norfolk, Mobile and New Orleans, 85.0c; Fontana, Calif., Provo, Utah, and Pueblo, Colo., 91.0c; prices include duty on imported ore and are subject to premiums, penalties and other provisions of amended M.P.R. No. 248, effective as of May 15. Price at basing points which are also points of discharge of imported manganese ore is f.o.b. cars, shipside, at dock most favorable to the buyer.

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

NATIONAL EMERGENCY STEELS (Hot Rolled)

(Extras for alloy content)

Basic open-hearth Electric furnace

Designation	Chemical Composition Limits, Per Cent — Carbon	Mn.	Si.	Cr.	Ni.	Mo.	Bars per 100 lb.	Billets per GT	Bars per 100 lb.	Billets per GT
NE 8612	.10-.15	.70-.90	.20-.35	.40-.60	.40-.70	.15-.25	$0.65	$13.00	$1.15	$23.00
NE 8720	.18-.23	.70-.90	.20-.35	.40-.60	.40-.70	.20-.30	.70	14.00	1.20	24.00
NE 9415	.13-.18	.80-1.10	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9425	.23-.28	.80-1.20	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9442	.40-.45	1.00-1.30	.20-.35	.30-.50	.30-.60	.08-.15	.80	16.00	1.30	26.00
NE 9722	.20-.25	.50-.80	.20-.35	.10-.25	.40-.70	.15-.25	.65	13.00	1.15	23.00
NE 9830	.28-.33	.70-.90	.20-.35	.70-.90	.85-1.15	.20-.30	1.30	26.00	1.80	36.00
NE 9912	.10-.15	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00
NE 9920	.18-.23	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00

Extras are in addition to a base price of 2.70c, per pound on finished products and $54 per gross ton on semifinished steel major basing points and are in cents per pound and dollars per gross ton. No prices quoted on vanadium alloy.

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941, amended Feb. 14, and Oct. 22, 1945. Exceptions indicated in footnotes. Base prices bold face, delivered light face. Federal tax on freight charges, effective Dec. 1, 1942, not included.

	Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$26.75	$26.25	$27.75	$27.25
Newark, N. J., del.	28.28	27.78	29.28	28.78
Brooklyn, N. Y., del.	29.25	.....	.....	29.75
Birdsboro, Pa., base	26.75	26.25	27.75	27.25
Birmingham, base	†22.13	†20.75	26.75	.....
Baltimore, del.	27.36	.....	.....	.....
Boston, del.	26.89	.....	.....	.....
Chicago, del.	25.97	.....	.....	.....
Cincinnati, del.	25.81	24.48	.....	.....
Cleveland, del.	25.87	24.99	.....	.....
Newark, N. J.	27.90	.....	.....	.....
Philadelphia, del.	27.21	26.71	.....	.....
St. Louis, del.	25.87	24.99	.....	.....
Buffalo, base	25.75	24.75	26.75	26.25
Boston, del.	27.25	26.75	28.25	27.75
Rochester, del.	27.28	.....	28.28	27.78
Syracuse, del.	27.83	.....	28.83	28.33
Chicago, base	25.75	25.25	26.25	25.75
Milwaukee, del.	26.85	26.35	27.35	26.85
Muskegon, Mich., del.	28.94	.....	.....	28.94
Cleveland, base	25.75	25.25	26.25	25.75
Akron, Canton, O., del.	27.14	26.64	27.64	27.14
Detroit, base	25.75	25.25	26.25	25.75
Saginaw, Mich., del.	28.06	27.56	28.56	28.06
Duluth, base	26.25	25.75	26.75	26.25
St. Paul, del.	28.38	27.88	28.88	28.38
Erie, Pa., base	25.75	25.25	26.75	26.25
Everett, Mass., base	26.75	26.25	27.75	27.25
Boston, del.	27.25	26.75	28.25	27.75
Granite City, Ill., base	25.75	25.25	26.25	25.75
St. Louis, del.	26.25	25.75	.....	26.25
Hamilton, O., base	25.75	25.25	.....	25.75
Cincinnati, del.	26.19	26.36	.....	26.86
Neville Island, Pa., base	25.75	25.25	26.25	25.75
§Pittsburgh, del. No. & So. sides	26.44	25.94	26.94	26.44
Provo, Utah, base	23.75	23.25	.....	.....
Sharpsville, Pa., base	25.75	25.25	26.25	25.75
Sparrows Point, base	26.75	26.25	.....	.....
Baltimore, del.	27.74	.....	.....	.....
Steelton, Pa., base	.....	26.25	.....	27.25
Swedeland, Pa., base	26.75	26.25	27.75	27.25
Philadelphia, del.	27.59	27.09	.....	28.09
Toledo, O., base	25.75	25.25	26.25	25.75
Youngstown, O., base	25.75	25.25	26.25	25.75
Mansfield, O., del.	27.69	27.19	28.19	27.69

Base grade, silicon 1.75-2.25%; add 50 cents for each additional 0.25% silicon, or portion thereof; deduct 50 cents for silicon below 1.75% on foundry iron. †For phosphorus 0.70% or over deduct 38 cents. §For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaco, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenbridge 1.24.

Note: Add 50 cents per ton for each 0.50% manganese or portion thereof over 1.00%.

Nickel differentials: Under 0.50%, no extra; 0.50% to 0.74% incl., $2 per ton; for each additional 0.25% nickel, $1 per ton.

High Silicon, Silvery

6.00-6.50 per cent (base)	....$31.25		
6.51-7.00	$32.25	9.01- 9.50	37.25
7.01-7.50	33.25	9.51-10.00	38.25
7.51-8.00	34.25	10.01-10.50	39.25
8.01-8.50	35.25	10.51-11.00	40.25
8.51-9.00	36.25	11.01-11.50	41.25

F.o.b. Jackson county, O., per gross ton, Buffalo base $1.25 higher, whichever is most favorable to buyer. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Electric Furnace Ferrosilicon: Sil. 14.01 to 14.50%, $45.50; each additional .50% silicon up to and including 18% add $1; low impurities not exceeding 0.05 Phos., 0.40 Sulphur, 1.0% Carbon, add $1.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton.

Charcoal Pig Iron

Northern

Lake Superior Furn. $34.00
Chicago, del. 37.34

Southern

Semi-cold blast, high phos. f.o.b. furnace, Lyles, Tenn., $28.50
Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn. 33.00
(For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Gray Forge

Neville Island, Pa. $25.25
Valley base 25.25

Low Phosphorus

Basing points: Birdsboro, Pa., Steelton, Pa., and Buffalo, N. Y., $31.25 base; $32.49, del. Philadelphia. Intermediate phos., Central Furnace, Cleveland, $28.25.

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differential: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorus Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorus content of 0.70% and over.

Ceiling Prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $1 per ton.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Duty

Pa., Mo., Ky. $68.50

First Quality

Pa., Ill., Md., Mo., Ky.	54.40
Alabama, Georgia	54.40
New Jersey	59.35
Ohio	47.70

Second Quality

Pa., Ill., Md., Mo., Ky.	49.35
Alabama, Georgia	40.30
New Jersey	52.00
Ohio	38.15

Malleable Bung Brick

All bases 63.45

Silica Brick

Pennsylvania	54.40
Joliet, E. Chicago	62.45
Birmingham, Ala.	54.40

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry Press	32.90
Wire Cut	30.80

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded Magnesite	65.00

Fluorspar

Metallurgical grade, f.o.b. Ill., Ky., net tons, carloads, CaF_2 content, 70% or more, $33; 65 but less than 70%, $32; 60 but less than 65% $31; less than 60%, $30. After Aug. 29 base price any grade $30.00 war chemicals.

Ferroalloy Prices

Ferromanganese (standard) 78-82% c.l. gross ton, duty paid, $135 f.o.b. cars, Baltimore, Philadelphia or New York, whichever is most favorable to buyer; Rockdale or Rockwood, Tenn.; where Tennessee Products Co. is producer; Birmingham, Ala., where Sloss-Sheffield Steel & Iron Co. is producer; $140 f.o.b. cars, Pittsburgh, where Carnegie-Illinois Steel Corp. is producer; add $6 for packed c.l., $10 for ton, $13.50 for less ton; $1.70 for each 1%, or fraction contained manganese over 82% or under 78%.

Ferromanganese (Low and Medium Carbon); per lb. contained manganese; eastern zone, low carbon, bulk, c.l., 23c; 2000 lb. to c.l., 23.40c; medium, 14.50c and 15.20c; central, low carbon, bulk, c.l., 23.30c; 2000 lb to c.l., 24.40c; medium 14.80c and 16.20c; western, low carbon, bulk, c.l., 24.50c, 2000 lb. to c.l., 25.40c; medium, 15.75c and 17.20c; f.o.b. shipping point, freight allowed.

Spiegeleisen: 19-21% carlots per gross ton, Palmerton, Pa., $36; Pittsburgh, $40.50; Chicago, $40.60.

Electrolytic Manganese: 99.9% plus, less ton lots, per lb. 37.6 cents.

Chromium Metal: 97% min. chromium, max. .50% carbon, eastern zone, per lb. contained chromium bulk, c.l., 79.50c, 2000 lb. to c.l. 80c; central 81c and 82.50c; western 82.25c and 84.75c; f.o.b. shipping point, freight allowed.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, R. R. freight allowed, eastern zone, $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: High carbon, eastern zone, bulk, c.l., 13c, 2000 lb. to c.l. 13.90c; central, add .40c and .65c; western, add 1c and 1.85c—high nitrogen, high carbon ferrochrome; Add 5c to all high carbon ferrochrome prices; all zones; low carbon eastern, bulk, c.l. max. 0.06% carbon, 23c, 0.10% 22.50c, 0.15% 22c, 0.20% 21.50c, 0.50% 21c, 1.00% 20.50c, 2.00% 19.50c; 2000 lb. to c.l., 0.06% 24c, 0.10% 23.50c, 0.15% 23c, 0.20% 22.50c, 0.50% 22c, 1.00% 21.50c, 2.00% 20.50c; central, add .4c for bulk, c.l. and .65 for 2000 lb. to c.l.; western, add 1c for bulk, c.l. and 1.85c for 2000 lb. c.l.; carload packed differential .45c; f.o.b. shipping point, freight allowed. Prices per lb. contained Cr high nitrogen, low carbon ferrochrome: Add 2c to low carbon ferrochrome prices; all zones. For higher nitrogen carbon add 2c for each .25% of nitrogen over 0.75%.

Special Foundry ferrochrome: (Chrom. 62-66%, car. approx. 5-7%) Contract, carload, bulk 13.50c, packed 13.95c, ton lots 14.40c, less, 14.90c, eastern, freight allowed, per pound contained chromium; 13.90c, 14.35c, 15.05c and 15.55c central; 14.50c, 14.95c, 16.25c and 16.75c, western; spot up .25c.

S.M. Ferrochrome, high carbon: (Chrom: 60-65%, sil. 4-6%, mang. 4-6% and carbon 4-6%.) Contract, carlot, bulk, 14.00c, packed 14.45c, ton lots 14.90c, less 15.40c, eastern, freight allowed; 14.40c, 14.85c, 15.55c and 16.05c, central; 15.00c, 15.45c, 16.75c and 17.25c, western; spot up .25c; per pound contained chromium.

S.M. Ferrochrome, low carbon: (Chrom. 62-66%, sil. 4-6%, mang. 4-6% and carbon 1.25% max.) Contract, carlot, bulk, 20.00c, packed 20.45c, ton lots 21.00c, less ton lots 22.00c, eastern, freight allowed, per pound contained chromium, 20.40c, 20.85c, 21.65c and 22.65c, central; 21.00c, 21.45c, 22.85c and 23.85c, western; spot up .25c.

SMZ Alloy: (Silicon 60-65%, Mang. 5-7%, zir. 5-7% and iron approx. 20%) per lb. of alloy contract carlots 11.50c, ton lots 12.00c, less 12.50c, eastern zone, freight allowed; 12.00c, 12.85c and 13.35c central zone; 14.05c, 14.60c and 15.10c, western; spot up .25c.

Silcaz Alloy: (Sil. 35-40%, cal. 9-11%, alum. 6-8%, zir. 3-5%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy contract, carlots 25.00c, ton lots 26.00c, less ton lots 27.00c, eastern, freight allowed, 25.50c, 26.75c and 27.75c, central; 27.50c, 28.90c and 29.90c, western; spot up .25c.

Silvaz Alloy: (Sil. 35-40%, van. 9-11%, alum. 5-7%, zir. 5-7%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy. Contract, carlots 58.00c, ton lots 59.00c, less 60.00c, eastern, freight allowed; 58.50c, 59.75c and 60.75c, central; 60.50c, 61.90c and 62.90c, western; spot up ¼c.

CMSZ Alloy 4: (Chr. 45-49%, mang. 4-6%, sil. 18-21%, zir. 1.25-1.75%, and car. 3.00-4.50%). Contract, carlots, bulk, 11.00c and packed 11.50c; ton lots 12.00c; less 12.50c, eastern, freight allowed; 11.50c and 12.00c, 12.75c, 13.25c, central; 13.50c and 14.00c, 14.75c, 15.25c, western; spot up .25c.

CMSZ Alloy 5: (Chr. 50-56%, mang. 4-6%, sil. 13.50-16.00%, zir. .75-1.25%, car. 3.50-5.00%) per lb. of alloy. Contract, carlots, bulk, 10.75c, packed 11.25c, ton lots 11.75c, less 12.25c, eastern, freight allowed; 11.25c, 11.75c and 12.50c, central; 13.25c and 13.75c, 14.50c and 15.00c, western; spot up .25c.

Ferro-Boron: (Bor. 17.50% min., sil. 1.50% max., alum. 0.50% max. and car. 0.50% max.) per lb. of alloy contract ton lots, $1.20, less ton lots $1.30, eastern, freight allowed; $1.2075 and $1.3075 central; $1.229 and $1.329, western; spot add 5c.

Manganese-Boron: (Mang. 75% approx., boron 15-20%, iron 5% max. sil. 1.50% max. and carbon 3% max.), per lb. of alloy. Contract ton lots, $1.89, less $2.01, eastern; freight allowed; $1.903 and $2.023, central, $1.935 and $2.055 western; spot up 5c.

Nickel-Boron: (Bor. 15-18%, alum. 1% max., sil. 1.50% max., car. 0.50% max., iron 3% max., nickel, balance), per lb. of alloy. Contract, 5 tons or more, $1.90, 1 ton to 5 tons, $2.00, less than ton $2.10, eastern, freight allowed; $1.9125, $2.0125 and $2.1125, central; $1.9445, $2.0445 and $2.1445, western; spot same as contract.

Chromium-Copper: (Chrom. 8-11%, cu. 88-90%, iron 1% max. sil. 0.50% max.) contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, except to points taking rate in excess of St. Louis rate to which equivalent of St. Louis rate will be allowed; spot up 2c.

Vanadium Oxide: (Fused: Vanadium oxide 85-88%, sodium oxide approx. 10% and calcium oxide, approx. 2%, or Red Cake: Vanadium oxide 85% approx., sodium oxide, approx. 9% and water approx.

2.5%) Contract, any quantity, $1.10 eastern, freight allowed per pound vanadium oxide contained; contract carlots, $1.105, less carlots, $1.108, central; $1.118 and $1.133, western; spot add 5c to contracts in all cases.

Calcium metal; cast: Contract ton lots or more $1.80, less, $2.30, eastern zone, freight allowed, per pound of metal; $1.809 and $2.309 central, $1.849 and $2.349, western; spot up 5c.

Calcium-Manganese-Silicon: (Cal. 16-20% mang. 14-18% and sil. 53-59%), per lb. of alloy. Contract, carlots, 15.50c, ton lots 16.50c and less 17.00c, eastern, freight allowed; 16.00c, 17.35c, and 17.85c, central; 18.05c, 19.10c and 19.60c western; spot up .25c.

Calcium-Silicon: (Cal. 30-35%, sil. 60-65% and iron 3.00% max.), per lb. of alloy. Contract, carlot, lump 18.00c, ton lots 14.50c, less 15.50c, eastern, freight allowed; 13.50c, 15.25c and 16.25c central; 15.55c, 17.40c and 18.40c, western; spot up .25c.

Briquets, Ferromanganese: (Weight approx. 3 lbs. and containing exactly 2 lbs. mang.) per lb. of briquets. Contract, carlots, bulk .0605c, packed .063c, tons .0655c, less .068c eastern freight allowed; .063c, .0655c, .0755c and .078c, central; .066c, .0685c, .0855c, and .088c, western; spot up .25c.

Briquets: Ferrochrome, containing exactly 2 lb. cr., eastern zone, bulk, c.l., 8.25c per lb. of briquets, 2000 lb. to c.l., 8.75c; central, add .3c for c.l. and .5c for 2000 lb. to c.l.; western, add .70c for c.l., and .2c for 2000 lb. to c.l.; **silicomanganese,** eastern, containing exactly 2 lb. manganese and approx. ½ lb. silicon, bulk, c.l., 5.80c, 2000 lbs. to c.l., 6.30c; central, add .25c for c.l. and 1c for 2000 lb. to c.l.; western, add .5c for c.l., and 2c for 2000 lb. to c.l.; **ferrosilicon,** eastern, approx. 5 lb., containing exactly 2 lb. silicon, or weighing approx. 2½ lb. and containing exactly 1 lb. of silicon, bulk, c.l., 3.35c, 2000 lb. to c.l., 3.80c; central, add 1.50c for c.l., and .40c for 2000 lb. to c.l.; western, add 3.0c for c.l. and .45c for 2000 to c.l.; f.o.b. shipping point, freight allowed.

Ferromolybdenum: 55-75% per lb. contained molybdenum f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Eastern zone, 90-95%, bulk, c.l., 11.05c, 2000 lb. to c.l., 12.30c; 80-90%, bulk c.l., 8.90c, 2000 lb. to c.l., 9.95c; 75%, bulk, c.l., 8.05c, 2000 lb. to c.l., 9.05c; 50%, bulk c.l., 6.65c and 2000 lb. to c.l., 7.85c; central 90-95%, bulk, c.l., 11.20c, 2000 lb. to c.l., 12.80c; 80-90%, bulk, c.l., 9.05c, 2000 to c.l., 10.45c; 75%, bulk, c.l., 8.20c, 2000 lb. to c.l., 9.65c; 50% bulk, c.l., 7.10c, 2000 lb. to c.l., 9.70c; western, 90-95%, bulk, c.l., 11.65c, 2000 lb. to c.l., 15.60c; 80-90%, bulk, c.l., 9.55c, 2000 lb. to c.l., 13.50c; 75%, bulk, c.l., 8.75c, 2000 to c.l., 13.10c; 50%, bulk, c.l., 7.25c, 2000 to c.l., 8.75c; f.o.b. shipping point, freight allowed. Prices per lb. contained silicon.

Silicon Metal: Min. 97% silicon and max. 1% iron, eastern zone, bulk, c.l., 12.90c; 2000 lb. to c.l., 13.45c; central, 13.20c and 13.90c; western, 13.85c and 16.80c; min. 96% silicon and max. 2% iron, eastern, bulk, c.l., 12.50c, 2000 lb. to c.l., 13.10c; central, 12.80c and 13.55c; western, 13.45c and 16.50c f.o.b. shipping point, freight allowed. Price per lb. contained silicon.

Manganese Metal: (96% min. manganese, max. 2% iron), per lb. of metal, eastern zone, bulk, c.l., 30c, 2000 lb. to c.l., 32c, central, 30.25c, and 33c; western 30.55c and 35.05c.

Ferrotungsten: Spot, carlots, per lb. contained tungsten, $1.90; freight allowed as far west as St. Louis.

Tungsten Metal Powder. Spot, not less than 97 per cent, $2.50-$2.60; freight allowed as far west as St. Louis.

Ferrotitanium: 40-45%, R.R. freight allowed, per lb. contained titanium; ton lots $1.23; less-ton lots $1.25; eastern. Spot up 5 cents per lb.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40 eastern. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20% contract basis, per gross ton, f.o.b. Niagara Falls, N. Y., freight allowed to destination east of Mississippi River and North of Baltimore and St. Louis, 6.8% carbon $142.50; 3-5% carbon $157.50.

Carbortam: Boron 0.90 to 1.15% net ton to carload, 8c lb. f.o.b. Suspension Bridge, N. Y., frt. allowed same as high-carbon ferrotitanium.

Boriam: Boron 1.5-1.9%, ton lots 45c lb., less ton lots 50c lb.

Ferrovanadium: 35-55%, contract basis, per lb. contained vanadium, f.o.b. producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Zirconium Alloys: 12-15%, per lb. of alloy, eastern contract, carlots, bulk, 4.60c, packed 4.80c, ton lots 4.80c, less tons 5c, carloads, bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot ¼c per ton higher.

Zirconium Alloy: 35-40%, Eastern, contract basis, carloads in bulk or package, per lb. of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot ¼ cent higher.

Alsifer: (Approx. 20% aluminum, 40% silicon, 40% iron) contract basis f.o.b. Niagara Falls, N. Y., per lb. 5.75c; ton lots 6.50c. Spot ½ cent higher.

Siminal: (Approx. 20% each Si., Mn., Al.) Contract, frt. all. not over St. Louis rate, per lb. alloy; carlots 8c; ton lots 8.75c; less ton lots 9.25c.

Borosil: 3 to 4% boron, 40 to 45% Si., $6.25 lb. cont. Bo., f.o.b. Philo, O., freight not exceeding St. Louis rate allowed.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Following prices are quotations developed by editors of STEEL in the various centers. For complete OPA ceiling price schedule refer to page 156 of Sept. 4, 1944, issue of STEEL. Quotations are on gross tons.

PHILADELPHIA:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.75
No. 2 Heavy Melt. Steel	18.75
No. 2 Bundles	18.75
No. 3 Bundles	16.75
Mixed Borings, Turnings	13.75
Machine Shop Turnings	13.75
Billet, Forge Crops	23.75
Bar Crops, Plate Scrap	21.25
Cast Steel	21.25
Punchings	21.25
Elec. Furnace Bundles	19.75
Heavy Turnings	18.25

Cast Grades

(F.o.b. Shipping Point)

Heavy Breakable Cast	16.50
Charging Box Cast	19.00
Cupola Cast	20.00
Unstripped Motor Blocks	17.50
Malleable	22.00
Chemical Borings	16.51

NEW YORK:

(Dealers' buying prices.)

No. 1 Heavy Melt. Steel	$15.33
No. 2 Heavy Melt. Steel	15.33
No. 2 Hyd. Bundles	15.33
No. 3 Hyd. Bundles	13.33
Chemical Borings	14.33
Machine Turnings	10.33
Mixed Borings, Turnings	10.33
No. 1 Cupola	20.00
Charging Box	19.00
Heavy Breakable	16.50
Unstrip Motor Blocks	17.50
Stove Plate	19.00

CLEVELAND:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.50
No. 2 Heavy Melt. Steel	19.50
No. 1 Comp. Bundles	19.50
No. 2 Comp. Bundles	19.50
No. 1 Busheling	19.50
Mach. Shop Turnings	14.50
Short Shovel Turnings	16.50
Mixed Borings, Turnings	14.50
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	13.50-14.00
Billet, Bloom Crops	24.50
Sheet Bar Crops	22.00
Plate Scrap, Punchings	22.00
Elec Furnace Bundles	20.50

BOSTON:

(F.o.b. shipping points)

No. 1 Heavy Melt. Steel	$14.06
No. 2 Heavy Melt. Steel	14.06
No. 1 Bundles	14.06
No. 2 Bundles	14.06
No. 1 Busheling	14.06
Machine Shop Turnings	9.06
Mixed Borings, Turnings	9.06
Short Shovel Turnings	11.06
Chemical Borings	13.81
Low Phos. Clippings	16.56
No. 1 Cast	20.00
Clean Auto Cast	20.00
Stove Plate	19.00
Heavy Breakable Cast	16.50

Boston Differential 99 cents higher, steel-making grades; Providence $1.09 higher.

PITTSBURGH:

(Delivered consumer's plant)

Railroad Heavy Melting	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 2 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
No. 2 Comp. Bundles	20.00
Short Shovel Turnings	17.00
Mach Shop Turnings	15.00
Mixed Borings, Turnings	15.00
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	16.00
Billet, Bloom Crops	25.00
Sheet Bar Crops	22.50
Plate Scrap, Punchings	22.50
Railroad Specialties	24.50
Scrap Rail	21.50
Axles	26.00
Rail 3 ft. and under	23.50
Railroad Malleable	22.00

VALLEY:

(Delivered consumer's plant)

No. 1 R.R. Hvy Melt.	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
Short Shovel Turnings	17.00
Cast Iron Borings	16.00
Machine Shop Turnings	15.00
Low Phos. Plate	22.50

MANSFIELD, O.:

(Delivered consumer's plant)

Machine Shop Turnings	15.00

BIRMINGHAM:

(Delivered consumer's plant)

Billet Forge Crops	$22.00
Structural, Plate Scrap	19.00
Scrap Rails Random	18.50
Rerolling Rails	20.50
Angle Splice Bars	20.50
Solid Steel Axles	24.00
Cupola Cast	20.00
Stove Plate	19.00
Long Turnings	8.50- 9.00
Cast Iron Borings	8.50- 9.00
Iron Car Wheels	16.50-17.00

CHICAGO:

(Delivered consumer's plant)

No. 1 R.R. Hvy Melt.	$19.75
No. 1 Heavy Melt. Steel	18.75
No. 2 Heavy Melt. Steel	18.75
No. 1 Ind. Bundles	18.75
No. 2 Dlr. Bundles	18.75
Baled Mach. Shop Turn	18.75
No. 3 Galv. Bundles	16.75
Machine Turnings	13.75
Mix. Borings, Sht. Turn	13.75
Short Shovel Turnings	15.75
Cast Iron Borings	14.75
Scrap Rails	20.25
Cut Rails, 3 feet	22.25
Cut Rails, 18-inch	23.50
Angles, Splice Bars	22.25
Plate Scrap, Punchings	21.25
Railroad Specialties	22.75
No. 1 Cast	20.00
R.R. Malleable	22.00

(Cast grades f.o.b. shipping point, railroad grades f.o.b. tracks)

BUFFALO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.25
No. 2 Heavy Melt. Steel	19.25
No. 1 Bundles	19.25
No. 2 Bundles	19.25
No. 1 Busheling	19.25
Machine Turnings	14.25
Short Shovel Turnings	16.25
Mixed Borings, Turn.	14.25
Cast Iron Borings	15.25
Low Phos.	21.75

DETROIT:

(Dealers' buying prices.)

Heavy Melting Steel	$17.32
No. 1 Busheling	17.32
Hydraulic Bundles	17.32
Flashings	17.32
Machine Turnings	12.32
Short Shovel, Turnings	14.32
Cast Iron Borings	13.32
Low Phos. Plate	19.82
No. 1 Cast	20.00
Heavy Breakable Cast	16.50

ST. LOUIS

(Delivered consumer's plant)

Heavy Melting	17.50
No. 1 Locomotive Tires	20.00
Misc. Rails	19.00
Railroad Springs	22.00
Bundled Sheets	17.50
Axle Turnings	17.00
Machine Turnings	$10.00
Shoveling Turnings	12.00
Rerolling Rails	21.00
Steel Car Axles	21.50-22.00
Steel Rails, 3 ft.	21.50
Steel Angle Bars	21.00
Cast Iron Wheels	20.00
No. 1 Machinery Cast	20.00
Railroad Malleable	22.00
Breakable Cast	16.50
Stove Plate	19.00
Grate Bars	15.25
Brake Shoes	15.25
(Cast grades f.o.b. shipping point)	
Stove Plate	18.00

CINCINNATI:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.50
No. 2 Heavy Melt. Steel	18.50
No. 1 Comp. Bundles	18.50
No. 2 Comp. Bundles	18.50
Machine Turnings	9.50-10.00
Shoveling Turnings	11.50-12.00
Cast Iron Borings	11.00-11.50
Mixed Borings, Turnings	10.50-11.00
No. 1 Cupola Cast	20.00
Breakable Cast	16.50
Low Phosphorus	21.00-21.50
Scrap Rails	20.50-21.00
Stove Plate	16.00-16.50

LOS ANGELES:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$14.00
No. 2 Heavy Melt. Steel	13.00
No. 1, 2, Deal. Bundles	12.00
Machine Turnings	4.50
Mixed Borings, Turnings	4.00
No. 1 Cast	20.00

SAN FRANCISCO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$15.50
No. 2 Heavy Melt. Steel	14.50
No. 1 Busheling	15.50
No. 1, No. 2 Bundles	13.50
No. 3 Bundles	9.00
Machine Turnings	7.00
Billet, Forge Crops	15.50
Bar Crops, Plate	15.50
Cast Steel	15.50
Cut, Structural, Plate, 1", under	18.00
Alloy-free Turnings	7.00
Tin Can Bundles	14.50
No. 2 Steel Wheels	15.50
Iron, Steel Axles	23.00
No. 2 Cast Steel	15.50
Uncut Frogs, Switches	15.50
Scrap Rails	15.50
Locomotive Tires	15.50

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NONFERROUS METAL PRICES

Copper: Electrolytic or Lake from producers in carlots 12.00c, Del. Conn., less carlots 12.12½c, refinery; dealers may add ¼c for 5000 lbs. to carload; 1000-4999 lbs. 1c; 500-999 1¼c; 0-499 2c. Casting, 11.75c, refinery for 20,000 lbs., or more, 12.00c less than 20,000 lbs.

Brass Ingot: Carlot prices, including 25 cents per hundred freight allowance; add ¼c for less than 20 tons; 85-5-5-5 (No. 115) 13.00c; 88-10-2 (No. 215) 16.50c; 80-10-10 (No. 305) 15.75c; Navy G (No. 225) 16.75c; Navy M (No. 245) 14.75c; No. 1 yellow (No. 405) 10.00c; manganese bronze (No. 420) 12.75c.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis, for carlots. For 20,000 lbs. to carlots add 0.15c; 10,000-20,000 o.25c; 2000-10,000 0.40c; under 2000 0.50c.

Lead: Common 6.35c, chemical, 6.40c, corroding, 6.45c, E. St. Louis for carloads; add 5 points for Chicago, Minneapolis-St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland-Akron-Detroit area, New Jersey New York state, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston-Worcester, Springfield, New Hampshire, Rhode Island.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lbs. and over; add ½c 2000-9999 lbs.; 1c less through 2000 lbs.

Secondary Aluminum: All grades 12.50c per lb. except as follows: Low grade piston alloy (No. 122 type) 10.50c; No. 12 foundry alloy (No. 2 grade) 10.50c; chemical warfare service ingot (92½% plus) 10.00c; steel deoxidizers in notch bars, granulated or shot, Grade 1 (95-97½%) 11.00c, Grade 2 (92-95%) 9.50c to 9.75c, Grade 3 (90-92%) 8.50c to 8.75c, Grade 4 (85-90%) 7.50c to 8.00c; any other ingot containing over 1% iron, except PM 754 and hardness, 12.00c. Above prices for 30,000 lb. or more; add ¼c 10,000-30,000 lb.; ½c 1000-10,000 lbs.; 1c less than 1000 lbs. Prices include freight at carload rate up to 75 cents per hundred.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lbs.) 20.50c lb., add 1c for special shapes and sizes. Alloy ingots, incendiary bomb alloy, 23.40c; 50-50 magnesium-aluminum, 23.75c; ASTM B93-41T, Nos. 2, 3, 4, 12, 13, 14, 17, 23.00c; Nos. 4X, 11, 13X, 17X, 25.00c; ASTM B-107-41T, or B-90-41T, No. 8X, 23.00c; No. 18, 23.50c; No. 18X, 25.00c. Selected magnesium crystals, crowns, and muffs, including all packing screening, barrelling, handling, and other preparation charges, 23.50c. Prices for 100 lbs. or more; for 25-100 lbs., add 10c; for less than 25 lbs., 20c. Incendiary bomb alloy, f.o.b. plant, any quantity; carload freight allowed all other alloys for 500 lbs. or more.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lbs., 1½c 1000-2239. 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 52.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05 per cent maximum arsenic, 51.87½c; Grade C, 99.65-99.79% incl. 51.62½c; Grade D, 99.50-99.64% incl., 51.50c; Grade E, 99-99.49% incl. 51.12½c; Grade F, below 99% (for tin content), 51.00c.

Antimony: American bulk carlots f.o.b. Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 14.50c; 99.8% and over (arsenic, 0.05%, max. and other impurities, 0.1%, max.) 15.00c. On producers, sales add ¼c for less than carload to 10,000 lb.; ½c for 9999-224 lb; and 2c for 223 lb. and less; on sales by dealers, distributors and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.5%, f.o.b. refinery 35.00c lb.; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot or ingot for additions to cast iron, 34.00c; Monel shot 28.00c.

Mercury: Open market, spot, New York, $93-$98 per 76-lb. flask.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be., $17 lb. contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks, and all other "regular" straight or flat forms 90.00c lb., del.; anodes, balls, discs and all other special or patented shapes 95.00c lb. del.

Cobalt: 97-99%, $1.50 lb. for 550 lb. (bbl.); $1.52 lb. for 100 lb. (case); $1.57 lb. under 100 lb.

Indium: 99.9%, $7.50 per troy ounce.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, N. Y. 70.625c per ounce.

Platinum: $35 per ounce.

Iridium: $165 per troy ounce.

Palladium: $24 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 12.00c, Conn., for copper. Freight prepaid on 100 lbs. or more.)

Sheet: Copper 20.87c; yellow brass 19.48c; commercial bronze, 90% 21.07c, 95% 21.28c; red brass, 80% 20.15c, 85% 20.36c; phosphor bronze, Grades A and B 5% 36.25c; Everdur, Herculoy, Duronze or equiv. 26.00c; naval brass 24.50c; manganese bronze 28.00c; Muntz metal 22.75c; nickel silver 5% 26.50c.

Rods: Copper, hot-rolled 17.37c, cold-rolled 18.37c; yellow brass 15.01c; commercial bronze 90% 21.32c, 95% 21.53c; red brass 80% 20.48c, 85% 20.61c; phosphor bronze Grade A, B 5% 36.50c; Everdur, Herculoy, Duronze or equiv. 25.50c; Naval brass 19.12c; manganese bronze 22.50c; Muntz metal 18.87c; nickel silver 5% 26.50c.

Seamless Tubing: Copper 21.37c; yellow brass 22.23c; commercial bronze 90% 23.47c; red brass 80% 22.80c, 85% 23.01c.

Extruded Shapes: Copper 20.87c; architectural bronze 19.12c; manganese bronze 24.00c; Muntz metal 20.12c; Naval brass 20.37c.

Angles and Channels: Yellow brass 27.98c; commercial bronze 90% 29.57c, 95% 29.78c; red brass 80% 28.65c, 85% 28.86c.

Copper Wire: Soft, f.o.b. Eastern mills, carlots 15.37½c, less-carlots 15.87½c; weatherproof, f.o.b. Eastern mills, carlot 17.00c, less-carlots 17.50c; magnet, delivered, carlots 17.50c, 15,000 lbs. or more 17.75c, less carlots 18.25c.

Aluminum Sheets and Circles: 2s and 3s, flat mill finish, base 30,000 lbs or more; del; sheet widths as indicated; circle diameter 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers; full sheets 9.50c; cut sheets 9.75c; pipe 8.15c, New York; 8.25c, Philadelphia, Baltimore, Rochester and Buffalo; 8.75c, Chicago, Cleveland, Worcester, Boston.

Zinc Products: Sheet f.o.b. mill, 13.15c; 36,000 lbs. and over deduct 7%; Ribbon and strip 12.25c, 3000-lb. lots deduct 1%, 6000 lbs. 2%, 9000 lbs. 3%, 18,000 lbs. 4%, carloads and over 7%. Boiler plate (not over 12") 3 tons and over 11.00c; 1-3 tons 12.00c; 500-2000 lbs. 12.50c; 100-500 lbs. 13.00c; under 100 lbs. 14.00c. Hull plate (over 12") add 1c to boiler plate prices.

Plating Materials

Chromic Acid: 99.75%, flake, del., carloads 16.25c; 5 tons and over 16.75c; 1-5 tons 17.25c; 400 lbs. to 1 ton 17.75c; under 400 lbs. 18.25c.

Copper Anodes: Base 2000-5000 lbs., del.; oval 17.62c; untrimmed 18.12c; electro-deposited 17.37c.

Copper Carbonate: 52-54% metallic cu, 250 lb. barrels 20.50c.

Copper Cyanide: 70-71% cu, 100-lb. kegs or bbls. 34.00c f.o.b. Niagara Falls.

Sodium Cyanide: 96%, 200-lb. drums 15.00c; 10,000-lb. lots 13.00c f.o.b. Niagara Falls.

Nickel Anodes: 500-2999 lb. lots; cast and rolled carbonized 47.00c; rolled, depolarized 48.00c.

Nickel Chloride: 100-lb. kegs or 275-lb. bbls. 18.00c lb., del.

Tin Anodes: 1000 lbs. and over 58.50c del.; 500-999 59.00c; 200-499 59.50c; 100-199 61.00c.

Tin Crystals: 400 lb. bbls. 39.00c f.o.b. Grasselli, N. J.; 100-lb. kegs 39.50c.

Sodium Stannate: 100 or 300-lb. drums 36.50c, del.; ton lots 33.50c.

Zinc Cyanide: 100-lb. kegs or bbls. 33.00c f.o.b. Niagara Falls.

Brass Mill Allowances: Prices for less than 15,000 lbs. f.o.b. shipping point. Add ½c for 15,000-40,000 lbs.; 1c for 40,000 or more.

Scrap Metals

	Clean Heavy	Rod Ends	Clean Turnings
Copper	10.250	10.250	9.500
Tinned Copper	9.625	9.625	9.375
Yellow Brass	8.625	8.375	7.785
Commercial bronze 90%	9.375	9.125	8.625
95%	9.500	9.250	8.750
Red Brass, 85%	9.125	8.875	8.375
Red Brass, 80%	9.125	8.875	8.375
Muntz Metal	8.000	7.750	7.250
Nickel Sil, 5%	9.250	9.000	4.625
Phos. br., A, B, 5%	11.000	10.750	9.750
Herculoy, Everdur or equivalent	10.250	10.000	9.250
Naval brass	8.250	8.000	7.500
Mang. bronze	8.250	8.000	7.500

Other than Brass Mill Scrap: Prices apply on material not meeting brass mill specifications and are f.o.b. shipping point; add ¾c for shipment of 60,000 lbs. of one group and ½c for 20,000 lbs. of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper, copper borings 9.75c; No. 2 copper wire and mixed heavy copper, copper tuyeres 8.75c.

(Group 2) soft red brass and borings, aluminum bronze 9.00c; copper-nickel and borings 9.25c; car boxes, cocks and faucets 7.75c; bell metal 15.50c; babbit-lined brass bushings 13.00c.

(Group 3) zincy bronze borings, Admiralty condenser tubes, brass pipe 7.50c; Muntz metal condenser tubes 7.00c; yellow brass 6.25c; manganese bronze (lead 0.00%-0.40%) 7.25c, (lead 0.41%-1.0%) 6.25c; manganese bronze borings (lead 0.00-0.40%) 6.50c, (lead 0.41-1.00%) 5.50c.

Aluminum Scrap: Price f.o.b. point of shipment, truckloads of 5000 pounds or over; Segregated solids, 2S, 3S, 5c lb., 11, 14, etc., 3 to 3.50c lb. All other high grade alloys 5c lb. Segregated borings and turnings, wrought alloys, 2, 2.50c lb. Other high-grade alloys 3.50, 4.00c lb. Mixed plant scrap, all solids, 2, 2.50c lb. borings and turnings one cent less than segregated.

Lead Scrap: Prices f.o.b. point of shipment. For soft and hard lead, including cable lead, deduct 0.55c from basing point prices for refined metal.

Zinc Scrap: New clippings 7.25c, old zinc 5.25c f.o.b. point of shipment; add ½-cent for 10,000 lbs. or more. New die-cast scrap, radiator grilles 4.95c, add ½c 20,000 or more. Unsweated zinc dross; die cast slab 5.80c any quantity.

Nickel, Monel Scrap: Prices f.o.b. point of shipment; add ½c for 2000 lbs. or more of nickel or cupro-nickel shipped at one time and 20,000 lbs. or more of Monel. Converters (dealers) allowed 2c premium.

Nickel: 98% or more nickel and not over ½% copper 26.00c; 90-98% nickel, 26.00c per lb. nickel contained.

Cupro-nickel: 98% or more combined nickel and copper 26.00c per lb. contained nickel, plus 8.00c per lb. contained copper; less than 90% combined nickel and copper 26.00c for contained nickel only.

Monel: No. 1 castings, turnings 15.00c; new clipping 20.00c; soldered sheet 18.00c.

Sheets, Strip . . .

Sheet & Strip Prices, Page 156

Rationing sheets and strip tonnage by producers to give equitable distribution has become practically universal, those who did not use this method immediately after the war now putting it into effect. Demand for sheets is increasing in proportion to difficulty in obtaining delivery. Delivery promises now are practically impossible to obtain outside the effort of all producers to provide as much as possible each quarter for their customers, in proportion to normal needs. Mills are sold far into next year.

New York—An increasing number of producers are now setting up schedules on a quota basis. Practically all grades of sheets are being affected, except stainless steel, for which, apart from the polished grades, there is no special pressure. Where producers did not set up a quota system immediately after the war, and there were only few who did, most are establishing quotas to take effect with the beginning of next year and in general are doing so for first quarter only.

At present relatively few sheet sellers have not set up quotas on the major grades, or who at least are not definitely planning doing so soon. As it is becoming increasingly difficult for producers to quote firm delivery, it would not prove surprising, however, if sellers generally will have to adopt some such rationing program. Difficulty in getting sheets has resulted in almost panic demand.

Boston—Fabricators now seeking narrow cold strip for first quarter are in for disappointment. Most mills are filled for that period and because of interruptions and extensions in hot strip delivery schedules, are confronted with further revisions in cold reduction timetable, possibly a 30-day setback forcing heavier withdrawals from inventories. Most are vulnerable to such strain on hot strip reserves. New orders about balance shipments and there is no recession in backlogs. Some fabricators are already pinched for stock. Reading, Pa., eight-inch maximum, and Newark, three-inch, are lowest basing points for cold-rolled stainless for New England. Waterbury-Farrel Foundry & Machine Co. is installing a four-inch caster-backing principle precision cold-strip mill for Wilbur B. Driver Co., Newark, N. J. District quotas permit small tonnage of sheets for wanted deliveries. Few producers have hot-rolled tonnage for first quarter and some electro-galvanized, but other finishes, including cold-rolled, spread well beyond with mill schedules upset and again undergoing revisions. Carryover volume is a major problem in realigning production and efforts to get cancellations on some of this tonnage are not promising. Other mills have not readjusted schedules to a point where definite delivery promise is possible and even orders which appeared firm several weeks back are now in danger of being extended. One fabricated cold-rolled product developed for war now going strong for civilians is the "bug" bomb; Westinghouse, East Springfield, is forming and brazing more than 5000 daily for the civilian market.

Pittsburgh — Output of sheets and strip generally has been well maintained, in contrast with other steel products, the past two weeks, although at least one producer has lengthened delivery

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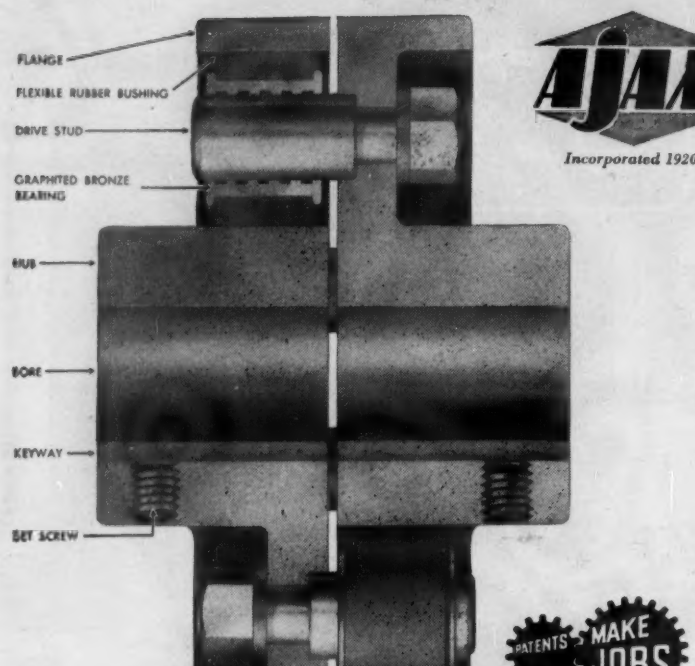

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WESTFIELD, N. Y.

schedules two weeks to a month. The manpower shortages in the finishing departments and inadequate annealing and pickling facilities are additional factors retarding production. Tonnage seeking position on rolling schedules continues to substantially exceed current output, while pressure for deliveries is still acute with no hold-ups of shipments reported. Refrigerator, stove, furnace and other household appliance manufacturers are pressing for early deliveries. Many sellers are reluctant to commit themselves too far in advance on delivery schedules, although consumers are seeking protection well into next year.

Philadelphia — Except where assured of some tonnage under a quota plan buyers of hot-rolled pickled and cold-rolled sheets can count on little before well into second quarter. These buyers can obtain some tonnage in April, but this is exceptional. They also would find difficulty in obtaining galvanized, except under rationing, before late second or early third quarter. Silicon sheets are in the same position. Plain hot-rolled sheets are still obtainable in February and March in at least wider sizes and unpolished stainless can be had in limited amounts as early as December. Polished stainless is quoted by some producers for late second quarter and beyond.

Cincinnati—Production of strip in this district will be cut for 10 days, during repairs to a Middletown slabbing mill of American Rolling Mill Co. Schedules will be maintained on cold strip. The departmental shutdown was not linked to shortage of coal, or threatened shortage. Effects of the recent mine strikes were noted chiefly in precautionary reduction in iron output. Mills are under pressure for deliveries in all grades. Several factors, including an attempt to set up quotas, make determination of the 1946 backlogs at this time impossible.

St. Louis—Pressure for cold-rolled and electrical sheets continues to increase as manpower becomes less. Output now is 70 to 75 per cent of volume expected after the war's end. Mill labor turnover is heavy with a continuous loss. Mills complain of losses on numerous items because of the wage-price squeeze and hope for OPA relief soon. Orders are heavy and exceed shipments substantially. Unfinished sheets continue to accumulate because of labor shortage in finishing departments, especially in light gages. Cold-rolled sheet deliveries are quoted in fourth quarter of 1946 and hot-rolled in June. Some electrical sheet tonnage is open in September.

Cleveland — Light sheet and strip, especially the latter, are extremely tight and some mills are making no delivery promises. While most mills are filled through April and many into second quarter, some material is available in first quarter but only in a few widths. Delivery in heavier gages is somewhat easier. Demand is surprisingly strong in view of the delay in attaining a high rate of civilian goods production. Although some large manufacturers, have not resumed production of their peacetime goods and others are making as little as 15 per cent of the amount planned when schedules were made following V-J Day, cancellation of steel orders to reflect this development has been negligible. Finished steel producers point

out, however, that their mills will have to operate several months at a high rate to fill the pipeline from semifinished mills to end product assembly lines. Some interests in the trade believe that cancellations will be substantial as soon as shipments start moving from mills in large volume.

Steel Bars . . .

Bar Prices, Page 156

Bar deliveries are being further extended and many producers now are booked virtually full for first half on smaller sizes of carbon quality. Large sizes are available in February and March, with medium a little later. Hot-rolled alloy steel bars are available in December, though some mills quote into February. Rationing of tonnage is becoming more general.

New York—The greater the scarcity, the more urgent the demand. This trade axiom is being borne out in carbon bars. This is especially true in lighter sizes, on which some mills are booked for virtually entire first half of next year. Medium size bars are being quoted generally for second quarter. Large rounds are still available in February and March, but schedules are tightening.

Hot alloy steel bars can still be had for shipment before the end of this year, although at least one seller is reported to be quoting late January and February. Demand for alloy steel is being better sustained than recently, but with the huge capacity built up during the war, it takes relatively heavy commitments to force an extension in shipments.

Boston — Alloy bar deliveries, stand-off for some weeks as between open-hearth and electric furnace, are still relatively easy, but with hot-rolled open-hearth now about one month more extended; both grades are available this quarter. Buying is light and in this product warehouse inventories are also ample. The opposite obtains in smaller sizes of carbon bars with first quarter about filled in most cases. Some mills are booked into May and June with slight chance of scheduling new orders earlier. Range in delivery, including cold-drawn, is abnormally wide even among integrated producers. Buying is maintained in spots more active; fabricators with orders in for first quarter are seeking to place supplemental tonnage for nearest production openings. Indicative of the spread between sizes, one producer has a 12 and 14-inch mill for early December and its eight-inch mill loaded to June, next year. Contract termination inventories are coming up for liquidation in greater volume, one involving bars includes 1045 tons of cold-drawn in small sizes by Norwalk Lock Co., South Norwalk, Conn.

Philadelphia — Producers of hot carbon bars who have not shifted to a quota basis generally quote small rounds for late second quarter, with large sizes in at least a few cases available as early as March. Most producers are fairly well cleared up on alloy bars for this year but have ample capacity for January.

Cleveland — Situation in bars is exactly reversed from war years, demand being most pressing now in smaller sizes and relatively easy in larger. Eight-inch mills are filled solidly for six months and extend into June while 10-inch mills are scheduled into February and

Ammunition Booster to feed belted ammunition to machine guns on Martin airplanes. Built of stainless steel by Brandt of Baltimore.

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the 12 and 14-inch mills into December. Acceptance of new business has been retarded by the growing shortage in steel but production is being maintained by drawing on mill reserves in some instances. At least one bar mill in this district was closed down last week because of the fuel shortage.

Pittsburgh — Consumers of carbon steel bars last week began to feel the acute shortage resulting from the coal strikes. This situation probably will grow more acute this week. A few consumers here started to taper operations late last week and were expected to be down completely this week. Mills are booked into second quarter on small sizes, with large rounds and alloys available in January.

Steel Plates . . .

Plate Prices, Page 157

Where plate demand had been expected to drop sharply after the war, when shipbuilding terminated, the expected has not come about and demand is far better than foreseen. Mills in most instances are filled into January and February on sheared plates, especially in lighter gages. Export buying is a factor, with considerable inquiry for this purpose.

Philadelphia—Although one producer quotes February and another has been in and out of that month for the past week to ten days plate deliveries generally fall in January on universal as well as sheared. However, one producer quotes March and April on universal plates ten inches and under. Demand generally is fairly brisk, particularly in light gages, but diversion of steel to other products is a factor in extended delivery in some cases.

Boston—Plate buying in volume by most larger industrial consumers, fabricators of heavy and electrical equipment, depends on further liquidation of inventories remaining from cancelled war contracts; reconversion problem is minor as a rule and there are indications orders for first quarter delivery will be heavier. Demand and pressure from tank and boiler shops is strong, concentrated largely in lighter sizes. Rehabilitation of numerous gasoline distributing stations, many closed until recently, accounts for some tonnage for tanks, pumps and other equipment. Among shipyards, Quincy division, Bethlehem Steel Co., is relatively active on a 40-hour week, employing about 16,500 on two full shifts, but delivery dates on Navy ships under construction have been extended. Shipyard plate buying, however, is near a standstill with some contract termination surplus to be liquidated.

New York — Producers of sheared plates are now well covered for the remainder of the year, with at least two having nothing available before February. Deliveries on light gage plates are especially tight, due primarily to demand for fuel storage tanks. Heavier gages, however, are moving fairly well, with export buying an important factor. As a whole plate business is holding up better than many expected a few months ago.

St. Louis—Unexpectedly strong demand for steel plates continues, probably double that expected after the war. The oil industry and structural fabricators are pressing strongly for 3/16 and ¼-inch plates. Heavier gages are in less demand but moving briskly. Mill schedules are filled to April.

San Francisco—Standard Oil Co. of California has awarded an initial construction contract for a 175-mile 18-inch oil pipe line to supply its refineries at Richmond, on San Francisco Bay. Costing $3 million, it is the largest oil line undertaken in California in recent years. Work will be started in December and completed in April. Pipe will be fabricated by A. O. Smith Corp., Milwaukee.

Tubular Goods . . .

Tubular Goods Prices, Page 157

Pittsburgh — Considerable seamless pipe tonnage has been going into new pipelines despite fact some of these projects are said to be temporarily held up by difficulty in arriving at an accurate cost estimate, as a result of the uncertain trend in pipe prices and labor costs. Sellers are booked three to four months on seamless, and six months on standard merchant pipe. Jobbers' stocks are well below normal, and there appears to be little possibility that inventories can be restored to desired levels this year, due to heavy demand and disruption to mill schedules by the coal strike.

Boston — Electric weld tubing, delivery still possible this quarter, is among the easiest of tubular products. Merchant steel pipe, notably butt-weld bessemer, is generally sold into second quarter. Buying and consigned stocks to distributors have slackened slightly, for the most part due to tightening of quotas by pipe mills. Actually consumer buying is not heavy, pressure for tonnage being largely for stock in anticipation of heavier building requirements. Seamless tubing is affected by changes in antifriction bearing sizes. Demand for the extreme small and larger sizes has slackened and the medium and automotive range is more in evidence.

Cleveland — Several pipe mills expect to have a voluntary quota system in full operation by the first of the year in an attempt to restore order books to a current basis. Flow of orders continues unabated but some mills are no longer scheduling them since doing so would be meaningless in view of the advanced positions which would be required. Under the quota system, mills would assure regular customers a stock equivalent to that held during a base period, in some instances in 1940. Jobbers' stocks would be reduced generally to a maximum of 90 days' needs. Some pipe and seamless tube mills have been closed in this district due to the fuel shortage but these are expected to be reopened shortly.

Wire . . .

Wire Prices, Page 157

New York — While there are scattered shallow spots in fine wire capacity, backlogs on other products extend through first quarter, on which pressure for delivery is intense. So great is the load for furniture and upholstery spring wire, some producers have withdrawn or making no definite delivery promise. Fine spring wire is almost as extended. Impact of war end is brought out in rope and rope wire, now available in 30 days. Nail schedules, in second quarter, are being overhauled by some producers who are rationing tonnage on a slightly

higher quota basis, but far below what distributors ask.

Boston — That wire consumers in numerous instances are over-specifying is the growing opinion among producers, who in screening orders to spread available capacity, find buyers seeking volume far in excess of normal requirements. This is frequently reduced or divided into several delivery periods. To what extent duplicate orders are included in backlogs is uncertain; mills have not improved deliveries in volume to bring this out through cancellations, if the condition exists. New orders are frequently ahead of shipments and no dent in backlogs is being made, with mills sold through first quarter on many high-carbon specialties.

Cleveland — Demand for merchant wire products is still far in excess of production. Average delivery is now about six months for all products but mills are making no definite promises and have a large volume which they have not attempted to schedule. Production cannot be increased much until operations can be resumed on a three-shift, 40-hour week basis.

Structural Shapes . . .

Structural Shape Prices, Page 157

Chicago — Mill output of structural shapes has decreased on account of the coal strike and carryovers are increasing. With rolling schedules already congested, new business commands no better than late first quarter or second quarter, 1946. Coupled with this, fabricators, affected by manpower shortage in engineering departments and shops, have sufficient work to keep them engaged for the balance of the year. Reports are that several large building projects are being postponed indefinitely because prices quoted on construction range 20 to 60 per cent in excess of estimates. New inquiry for fabricated steel has fallen sharply, and awards the past few days have been light.

Boston—Brisk demand for light shapes in smaller lots emanates from district structural shops with more work. Disruption of some mill schedules has lengthened deliveries well into first quarter, increasing pressure on warehouses; replacements with the latter are not keeping pace. Loss of tonnage by structural mills is uneven, widening range of deliveries; some are in February, while others have tonnage earlier, including one producer permitted premium prices. Active inquiry has slackened following a bulge in lettings for fabricated steel; American Bridge Co., Pittsburgh, booked 500 tons for a building for National Carbon Co. Inc., St. Albans, Vt. Stone & Webster Engineering Corp. has a large backlog of work requiring heavy steel tonnages, including a power plant addition at Venice, Ill., for Union Electric Co. of Missouri to cost $9 million with equipment.

Cleveland — Placing of awards for several large plants in this and surrounding cities, including Elyria, Lorain, Bedford and Canton, in addition to those for smaller plants and additions have loaded structural shape mills for months to come. Most mills are reluctant to take on additional business at this time. Some construction work has been postponed indefinitely because contracting costs have been found to exceed preliminary estimates. A majority of projected highway and other public works have been shelved, pending an easing in the supply of structural shapes and the arrival of a period when this type of work can be used to take up the slack in other construction activity.

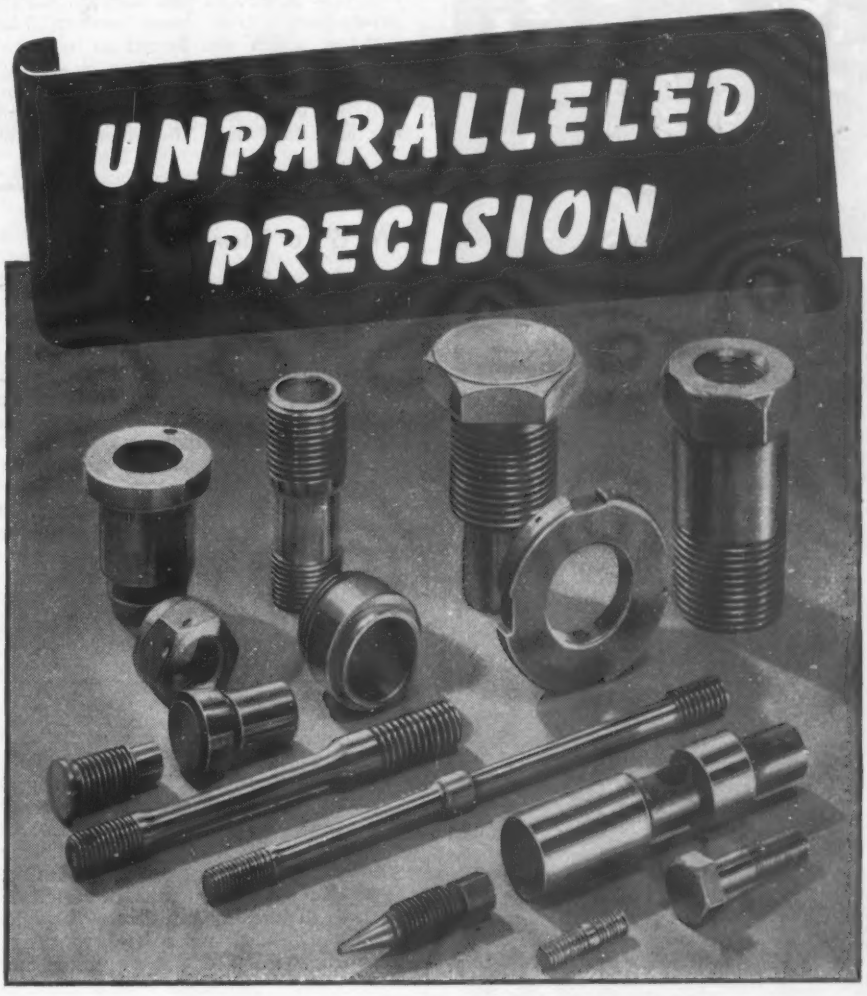
Birmingham — Shapes are in heavy demand for miscellaneous construction and highway work. Fabricators report no slackening in current bookings. Some gaps in mill schedules, due to cancellations, have been filled promptly.

Seattle—Structural fabricators report an increasing number of small jobs totaling considerable tonnage, which keeps local plants busy. Industrial and highway work is developing. Puget Sound Navy Yard opened bids Oct. 23 for a dock subdivision involving 200 tons, one girder using 100 tons. Multnomah county, Oregon, plans an 1100-foot steel bridge span near Portland, costing $450,000, tonnage unstated.

Pig Iron . . .

Pig Iron Prices, Page 159

While pig iron production in October has been deeply cut by lack of coke during the soft coal strike, consumption held fairly well in comparison with earlier months. However, this has caused inventories to diminish materially and no rebuilding will be possible for some time, as production will be low



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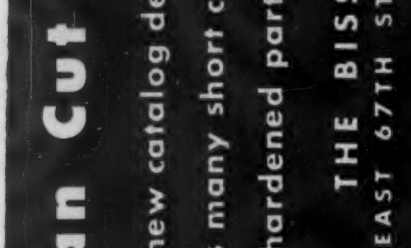

until coke output can be resumed at a higher rate. Advance of 75 cents per ton in pig iron price by Office of Price Administration is considered only partial relief from advancing costs. Since prices were frozen in June, 1941, total increase has been $1.75 per ton.

New York — Pig iron melt in this district for October will be fairly comparable with that for September, as the coal strike ended just before sharp curtailment was necessary, due to shortage of coke and pig iron. Stocks of these materials at local foundries were sufficient to enable melters to carry on at about the same rate. However, there is little likelihood of improvement for a while because it will require time for coke ovens and blast furnaces which were forced to suspend because of the soft coal strike, to get back to normal production. One large eastern blast furnace, which was forced to bank two or three weeks ago because of shortage of fuel, starts up again this week, but will not likely get back to normal production until mid-November. Certain other eastern furnaces are again starting up at this time.

WPB To Clarify Ruling on Pig Iron Priorities

War Production Board will issue a statement this week clarifying an announcement made last week regarding aid to be given consumers of pig iron in obtaning that material. The original statement indicated that pig iron was being placed under a comprehensive preference rating system. It is now indicated this was a mistake and that WPB will consider only extreme hardship cases affecting critical production programs. Only "CC" ratings will be issued it is said. This rating is applied to break bottlenecks in production of civilian goods.

Price advances of 75 cents a gross ton on all grades of pig iron, as permitted recently by the Office of Price Administration, follows the dollar increase granted last February on all grades, except charcoal, which was not included because of certain adjustments at other times. Thus, all principal grades have been advanced $1.75 a ton since June, 1941, when producers volunteered, at the request of the government, to freeze prices at existing levels, because of the growing emergency.

These increases have come slowly, with producers generally contending that they have not kept abreast of advances in costs. It is recalled that last February, at the time the first increase was made, some producers presented figures showing that their costs since June, 1941, had advanced about $4.75 a ton. However, the OPA, it is pointed out, insisted that most producers being integrated interests, with revenue coming in from other products, were able to absorb the increase in cost. The purely merchant furnaces were at one time or another given special relief, but inadequate in the opinion of these producers.

Boston — With 30-day inventory limitation waived, one steel works is putting down fourth quarter requirements of basic by barge from Troy, N. Y.; another with stocks under 30 days has iron enroute from Buffalo by water but probably not enough to go through this quarter. Canal traffic stops next month and all Buffalo iron will move to this area by rail. Buffalo furnaces are moving about all iron possible. Unless unforeseen factors develop consumers in this section will have to scratch for iron this winter, especially if transportation weakens. Meanwhile melt holds even, well distributed through subcontracting, with some shops turning down tonnage offered. Several automatic molding lines have been installed, but have not reached capacity due to labor limitations.

Cleveland—Iron shipments move from most furnaces at a fair rate by juggling grades in some instances, despite widespread shutdowns due to fuel shortages. Foundries have been able to make the necessary changes in their mixes and have sustained operations as high as manpower will permit. The situation will remain critical, however, for an additional 45 days. Pig iron shipments likely will not regain the rate prevailing prior to the coal strikes until mid-November.

Cincinnati — The foundry melt has been sustained during the period of reduced coal output, but curtailments in supplies, even though temporary, cut into reserves. Melters may specify heavier for next month, in hope that a moderately easier labor situation will enable expansion of melt. Present indications are that melters will be held close to October tonnage.

Pittsburgh — Pig iron output here improved slightly last week, but no significant upturn is scheduled until middle of this week, for coke production is still below normal. Disruption of blast furnace activity has made the pig iron supply situation tight, with foundries taking steadily increasing tonnage. However, lower steel production has helped matters considerably. A number of additional units could be brought into service, but are said to be too high cost under present price ceilings, while labor shortage is still an important factor.

Buffalo — With pig iron output still held at 70½ per cent of capacity by fuel shortage sellers report a tight market. Many foundries are on the verge of reducing operations. Merchant sellers have been forced to cut shipments to New England and Michigan as well as to melters in this area. Bethlehem and Hanna interests have each resumed production on a stack banked a week ago. Five of seventeen stacks in this area are idle.

Philadelphia — Tightness of pig iron is expected to be relieved soon by resumption of operations at certain furnaces selling in this district. By the middle of November output is expected to be about equal to that prevailing before the coal strike. However, some consumers of basic are expected to have a tight squeeze during the next fortnight.

Scrap . . .

Scrap Prices, Page 160

Strength is maintained in scrap, accented by the effects of the coal strike. Dealers find melters willing to pay ceilings and substantial equalizations in addition. Supply is not large and all offerings of good material are taken readily.

Pittsburgh — The coal strikes created

an abnormally heavy demand for blast furnace scrap, but the amount of good carbon turnings available remain far short of requirements. Full ceilings are being paid for machine shop and short shoveling turnings, in some instances getting freight equalizations up to $1. Dearth of heavy melting steel shows no signs of easing, with some consumers paying up to $1.50 freight equalization for substantial tonnages. Use of electric furnace scrap as a substitute for open-hearth grades is not prevalent in this district, with scrap dealers finding it difficult to furnish adequate tonnages for electric furnace operations. Distribution of Pennsylvania Railroad's scrap list, involving about 18,000 tons, was made last week at full ceiling prices. Scrap brokers here received a small portion of this material, which was made for the first time in many months free from government allocation.

Buffalo — Fresh interest has appeared in the scrap market and further sales have been made. The situation is strong and melters are taking all offerings. Dealers find it increasingly difficult to obtain scrap tonnage. Much interest is shown in material offered from contract terminations.

Detroit—Demand far exceeds supply in the scrap market and all grades are straining at ceiling prices. Ford has been in the market for two weeks, as steel operations there move up to the highest level of the year. Great Lakes Steel is buying all grades, even including premium electric furnace material, now that restrictions on use of the latter in open hearths have been lifted. Meanwhile, supplies are low and new automotive lists are not promising. One of the first of the month-end lists, from Chevrolet, is 50 per cent off from last month.

Boston—Although open sales of surplus and terminated contract scrap become more frequent, alloy-free carbon in heavy melting grades is none too plentiful and turnings are tight. Including bundles, steel plant rejections are frequent, one consumer turning down three lots. Potentially supply outlook is improved by prospective liquidation of war material at increased pace, which up to now has been slow. In considerable lots, some of this material will include alloys, including discarded prefabricated parts. Consumers are unable to build inventories of cast, but in one case, a steel works now has 45 days compared with 30 days some weeks back. Steelmaking grades up to specification are at ceiling, also specialties; 280 tons of railroad car wheels brought $20 from Charles Dreifus & Co.; 400 tons of prepared heavy melting, $14.06 from David Feinberg Co. Boston navy yard has bids on accumulations through balance of the year, including 1000 tons of unprepared.

St. Louis—Scrap buying locally is listless, with considerable demand from Chicago mills. Receipts are a little better, though still 20 per cent below normal. Mill reserves are 30 to 60 days and foundry stocks about 30 days. Current shipments about equal consumption. Some orders are being placed on a 30-day shipment basis and some old orders are being extended because of slow shipments. Prices are at ceiling except for borings and turnings.

Cleveland — While scrap still is in tight supply it is somewhat better than

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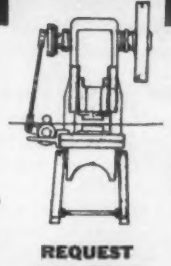

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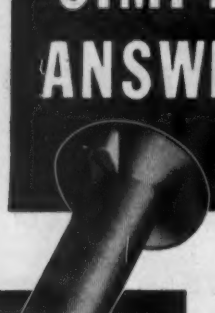

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ten days ago. Industrial scrap is in better supply, indicating enlarged operations of reconverted plants. Steel mills are not buying at the moment, having tonnage still on order, on which deliveries are being made steadily. Some scrap is arriving by lake, the movement being accelerated by desire to move it before navigation closes. Prices on all grades are strong at ceiling.

Seattle — More high-grade steel scrap is on the market than steelmakers can use. Turnover is active but inventories are not being materially increased. Bethlehem Steel Co. has bought 25,000 tons of unprepared scrap from Todd shipyards, consisting of prefabricated units and partially built hulls cut down. Kaiser yards at Vancouver and Swan Island are reported to be offering 25,000 tons of similar material and Oregon Shipbuilding Corp., Portland, Oreg., is said to have 40,000 to 50,000 tons on sale. The price remains steady at $10 per gross ton, f.o.b. plant, for prepared material.

Philadelphia — At least two district consumers of heavy melting steel have entered the market during the past week after having been out for most of the month, and another is expected in momentarily. Supplies will be sufficient to meet these increasing demands but with little leeway, as yards still are handicapped by labor shortage, which has improved little since the end of the war. Increasing shortage of turnings and cast scrap continues. Further landing mat tonnage is being offered by the government along the eastern seaboard. Approximately 53,000 tons of this unprepared material has been sold recently, including 10,000 tons at Norfolk within the past few days.

Warehouse . . .

Warehouse Prices, Page 158

Pittsburgh—Recent OPA action, effective Oct. 19, permitting steel warehouse interests to increase prices to cover the actual carload costs incurred in buying material from other than their usual suppliers and having it processed for resale at another location is not applicable to distributors in this district for the few here that are not owned by a steel producer have been able to meet their steel requirements from usual source of supply. However, in other sections of the country this recent OPA ruling will benefit steel distributors for in some cases resellers have been unable to obtain from the mills the particular kind of steel product required, and therefore were obliged to buy unfinished material and have it processed elsewhere at additional cost.

Boston — Structural shapes approach flat-rolled products in limited supply with more warehouses. Replacement of active products is further behind schedule. Additional inquiry is going to distributors from consumers with delayed mill tonnage deliveries. Alloy buying still lags, but stainless, notably polished sheets, is active. Nothing before second quarter in this grade is possible with some producers.

New York—Inquiry for warehouse steel is heaviest since V-J day, extended mill deliveries contributing. Of major products, only plate and alloy inventories are ample and there is heavier buying of plates, notably in lighter ranges. Replacement of flat-rolled products, sheets especially, for which demand is heaviest, has not improved and inventories are becoming increasingly out of balance. Polished stainless sheets are in heavy demand. Affecting products as well as sizes, warehouses have gone on new basing points for stainless, Newark, N. J., for bars, Baltimore for sheets and Pittsburgh for tubing. A switching charge at Newark brings delivered prices 10 cents per hundred pounds over the mill basing price.

Cleveland — Extension of the multiple basing point system for steel products is not expected to have any effect on distribution of products by warehouses, since they will pass on to their customers any changes in freight. Pricing is becoming an increasingly complicated procedure, however. Stocks of flat-rolled products are low with demand still pressing and tending toward larger individual orders. Movement of other steel products is well maintained.

Cincinnati — Mill replacements for warehouse stocks are lagging while demand resembles wartime peaks. Individual orders are larger, reflecting reconversion efforts for which steel direct from mills is not available. Demand for building steel is up. Labor is easier, making for quicker deliveries on items requiring preparation.

Iron Ore . . .

Iron Ore Prices, Page 158

Consumption of Lake Superior iron ore in September totaled 5,837,017 gross tons, compared with 5,658,278 tons in August and with 6,950,255 tons in September, 1944, according to the Lake Superior Iron Ore Association, Cleveland. Cumulative consumption for nine months is 58,373,871 tons, compared with 65,954,182 tons in the comparable period last year.

Stocks on hand at furnaces and Lake Erie docks Oct. 1 totaled 39,549,055 tons, compared with 34,781,382 tons a month earlier and 41,943,299 tons a year earlier. Furnaces in blast Oct. 1 numbered 142 in the United States and 6 in Canada, compared with 146 and 6 a month earlier and 170 and 6 a year ago.

Canada . . .

Toronto, Ont.—Buying is growing in volume in the Canadian steel market and consumers are covering for first quarter to assure delivery rather than as protection against advancing prices. On some materials mills now are almost fully booked to the end of March, while on others considerable unfilled capacity remains. During the past few days there has been noticeable improvement in consumer goods on retail shelves, but civilian production has not yet reached anything like capacity. Shortage of steel continued to retard production while plant reconversion and labor supply are other factors deterring full output. However, the labor situation has eased considerably and the only problem appears to be in connection with skilled workers, as thousands of unskilled men are seeking employment. So far Canadian steel production has not been affected by labor disputes or shortage of coal supply, but it has been reduced by necessary shutdowns for repairs. With much of the pressure off steel production on war account, producers now are chiefly

concerned with meeting civilian demand and it is stated that prospective business on this account is sufficient to take care of output for two or three years.

There has been no easing in supply of black and galvanized sheets and producers are endeavoring to keep as many customers as possible supplied. Buying is gaining in volume for first quarter and some makers already are almost fully booked for that period. Warehouse distributors are pressing for supplies and stocks are small. With war pressure off there has been slowing in imports of sheets from the United States, largely due to the fact that American producers are not in a position to supply large tonnage on this side of the border.

In both wire and nails demand is well in excess of production and consumers have difficulty obtaining sufficient for immediate needs

Sustained interest continues in scrap and local dealers state that inquiries are more persistent, both from foundry interests and steel mills. Receipts are well down from the year's average and most dealers depend on day-to-day deliveries to meet consumer demands. Industrial plant scrap has dropped off sharply and while there has been some improvement from rural districts, it is not sufficient to fill demands. It now appears likely that Canadian consumers and dealers will endeavor to increase imports from the United States to meet winter requirements. Stocks at mills are not sufficient to carry them through to April or May and they are adding little to their reserves.

Steel in Europe . . .

London — (*By Radio*) — Steel production is increasing in Great Britain and domestic and export inquiries are larger. Higher prices are expected soon, due to rising costs of production. Rail mills are active on heavy orders for railroad rehabilitation. Sheet deliveries are becoming more extended.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

2300 tons, manufacturing plant addition between plants Nos. 6 and 9, Pontiac, Mich., for Pontiac Motor Car Division, General Motors Corp., to Whitehead & Kales Co., Detroit; bids Sept. 21.

1200 tons, Beverwyck Breweries, Albany, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.

830 tons, factory for Fanny Farmer Candy Co., New York, to Harris Structural Steel Co., New York, through Irons & Reynolds, New York, general contractors.

728 tons, North Cadanian river bridge, Eufaula, Okla., for Missouri, Kansas & Texas railroad, to Bethlehem Steel Co., Bethlehem, Pa.; bids Sept. 8.

550 tons, plant addition for American Car & Foundry Co., Berwick, Pa., to Lehigh Structural Steel Co., Allentown, Pa., through Sordini Construction Co., Forty Fort, Pa.

500 tons, one story, 160 x 500 factory building, National Carbon Co. Inc., St. Albans, Vt., to American Bridge Co., Pittsburgh; Gillmore, Carmichael, Olsen Co., Cleveland, general contractor.

500 tons, plant addition and warehouse at Seattle nut and bolt unit, of Bethlehem Steel Co., Seattle.

450 tons, South Concho river bridge, San Angelo, Tex., for state highway commission, to Mosher Steel Co., Houston, Tex.

270 tons, pumping station at Torresdale, Pa., to American Bridge Co., Pittsburgh, through Ralph Herzog, Philadelphia.

270 tons, spare parts plant for Ford Motor Co. at Chester, Pa., to American Bridge Co., Pittsburgh, through Irwin Leighton, Philadelphia.

250 tons, glass plant, Shreveport, La., for Libbey-Owens-Ford Glass Co., to Mosher Steel Co., Houston, Tex.

230 tons, beam spans for bridges 428.86, 429.29 and 429.18, Los Angeles, for Union Pacific railroad, to American Bridge Co., Pittsburgh.

STRUCTURAL STEEL PENDING

3500 tons, assembly plant for Ford Motor Co., near New Brunswick, N. J.; bids through Albert Kahn Architects, Detroit.

2500 tons, widening of Whitestone bridge, New York; Woodcrest Construction Co., New York, low on general contract.

2200 tons, administration building and other work for the Navy, near White Oak, Md.; C. H. Tompkins, Washington, low on general contract.

500 tons, plant addition for L. A. Young Spring Co., Trenton, N. J.; bids Oct. 29.

200 tons, drydock subdivision, Puget Sound navy yard; bids opened Oct. 23.

Unstated, $450,000, steel span Sauvier Island, near Portland, Oreg.; plans in preparation.

Unstated, caisson facilities for Coulee dam; bids to Denver, Nov. 20.

REINFORCING BARS . . .

REINFORCING BARS PLACED

3000 tons, stamping plant, Fisher Body Co., Hamilton, O., to Pollak Steel Co., Cincinnati, through Frank Messer & Son.

1400 tons, flood wall, Portsmouth-New Boston, O., to Jones & Laughlin Steel Corp., Pittsburgh, through Dravo Corp., Pittsburgh.

1000 tons, electronics plant, General Electric Co., near Syracuse, N. Y., originally reported placed with Truscon Steel Co., Youngstown, now reported awarded to Bethlehem Steel Co., Bethlehem, Pa.

800 tons, Hartford hospital, Hartford, Conn., to Bethlehem Steel Co., Bethlehem, Pa., through Geo. A. Fuller Co.

800 tons, axle plant No. 5, Pontiac Motor Co., Pontiac, Mich., to Truscon Steel Co., Youngstown through O. W. Burke Co.

800 tons repair shop fire department Long Island City, N. Y., to Fireproof Products Co., through Corbetta Construction Co.

472 tons, including 301 tons, FA route 13, Sec. 2-2, and 171 tons, Sec. 3-2, same route, Lawrence County, Illinois, for Illinois state highway commission, to Laclede Steel Co., St. Louis; Harrison Engineering & Construction Corp., Kansas City, Mo., contractor; bids Sept. 14.

400 tons, Rochester Institute of Technology, Rochester, N. Y., to Bethlehem Steel Co., Bethlehem, Pa., through John B. Pike & Son.

200 tons, power house, Connecticut Power & Light Co., Devon, Conn., to Joseph T. Ryerson & Son, Inc., Jersey City, N. J., through United Engineers.

185 tons, FA route 5, Sec. 20-R, Logan county, Illinois, for Illinois state highway commission, to Ceco Steel Products Corp., Cicero, Ill.; C. C. O'Connor & Son Inc., Ft. Wayne, Ind., contractor; bids Sept. 14.

100 tons, freight house, Chicago, for Chicago, Milwaukee, St. Paul & Pacific railroad, to Joseph T. Ryerson & Son Inc., Chicago; Thorgersen & Ericksen Co., Chicago, contractor.

REINFORCING BARS PENDING

1500 tons, assembly plant, Robertson, Mo., for Ford Motor Co.

1400 tons, Elliott Houses, Tenth avenue and 24th Street, New York; bids Oct. 25 to City Housing Authority.

600 tons, factory building No. 4, Buick Motor

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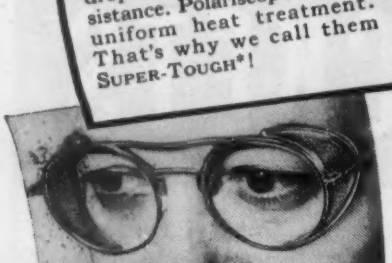

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587 tons, expansion, Sugar Grove, Mo., for Standard Oil Co. of Indiana.

447 tons, Mortmar, Calif., for Bureau of Reclamation.

400 tons, McKnight Road, Allegheny county, Pennsylvania.

300 tons, expansion, Mankato, Minn., for Archer-Daniels-Midland Co.

267 tons, express highway and bridge, Newark to Elizabeth, N. J.

200 tons, tunnel, Philadelphia Electric Co., Philadelphia.

219 tons, Flores, Iowa, for Chicago, Rock Island & Pacific railroad.

208 tons, Belknap, Iowa, for Chicago, Rock Island & Pacific railroad.

195 tons, Sears, Roebuck Co., Mansfield, O.

175 tons, wind tunnel, Cleveland, for National Advisory Committee for Aeronautics.

150 tons, tunnel, Philadelphia, for Philadelphia Electric Co.

PIPE . . .

CAST IRON PIPE PLACED

300 tons, 20-inch, cement-lined, Panama, to United States Pipe & Foundry Co., Bessemer, Ala., $14,256; bids Oct. 5.

PLATES . . .

PLATES PLACED

Unstated, 36-inch water pipe, for Portland, Oreg., improvement; American Pipe & Construction Co., Portland, low at $440,716.

RAILS, CARS . . .

RAILROAD CARS PLACED

Baltimore & Ohio, eight sleeping cars to Pullman-Standard Car Mfg. Co., Chicago.

Chicago, Rock Island & Pacific, 250 auto box cars, to American Car & Foundry Co., New York.

Clinchfield, 20 seventy-ton hoppers, to American Car & Foundry Co., New York.

Reading Co., 1000 fifty-ton box cars, to own shops.

RAILROAD CARS PENDING

Southern Railway, 1000 fifty-ton automobile box cars; bids asked.

LOCOMOTIVES PLACED

Central of New Jersey, three 2000-horsepower diesel-electric passenger locomotives, to Baldwin Locomotive Works, Philadelphia.

Gulf, Mobile & Ohio, 24 diesel locomotives, including 20 freight locomotives, two streamlined passenger engines and two road switchers, to Electro-Motive Corp., La Grange, Ill.

LOCOMOTIVES PENDING

Missouri-Kansas-Texas, six 1000-horsepower diesel switch engines; purchase authorized.

RAILS PENDING

Missouri-Kansas-Texas, 146 miles of 112-pound rail; purchase authorized.

General Motors Chief Advances Wage Plan

(*Concluded from Page* 71)

fly-by-night manufacturers profit margins of established producers have been lower during the war than before (General Motors rate was about one-half, for example). Future profits have not been determined as yet, regardless of what rate of production prevails. Excess profits tax refunds represent money already spent and cannot now be doled out to meet wage increases for work not performed.

A good case for an accelerated work schedule can be presented. Practically all other countries are planning to work far longer than 40 hours per week to achieve reconstruction. A tremendous U. S. government debt, which shows signs of growing larger rather than smaller, must be shouldered. Millions of starving and destitute families in foreign lands must be aided, largely from the U. S. purse. Veterans must be rehabilitated, and those still overseas supported. Foreign industry must be rehabilitated through U. S. loans. Industry in this country must be retooled, expanded, modernized for a larger production load —which takes time and patience.

There is no magical formula by which industry can simply pay out 30 per cent higher wages and get nothing in return.

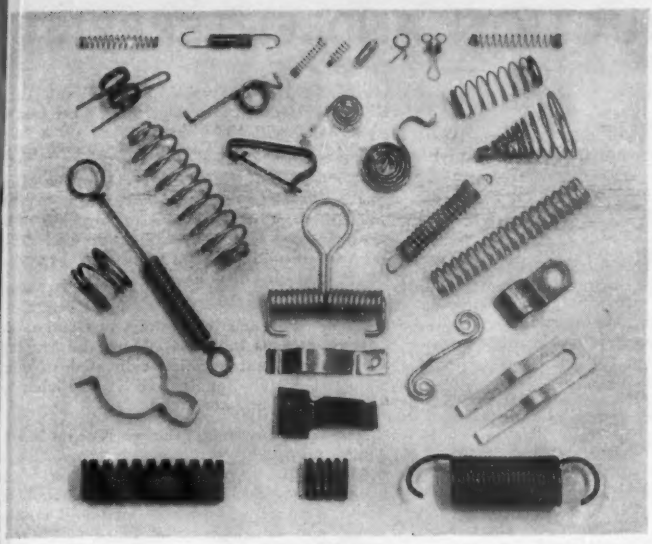
Work is the only answer. Strikes destroy the purchasing power of those made idle, adding fuel to the fires of class hatred and generating a mounting disregard for established law and authority, not only among adults but among future generations of working people as well.

Asked by STEEL for his opinion on whether suitable legislation might be enacted along the lines of his suggestions in time to avoid strikes in the automotive industry, Mr. Wilson said he did not think so, and echoed sentiments of other GM executives to the effect strikes probably would be called before the end of the year in their plants.

Specifically, Mr. Wilson stated, with respect to the law covering a 40-hr week, "I think that labor will be fearful to change that, even temporarily, to meet the war emergency, or the aftermath of war, the reconversion problems. They will be afraid that labor will lose some gains. I doubt if it will be politically feasible right away to do that.

"I would favor it (the longer work week) only during the readjustment period, say three to five years. I hope by that time we won't have to feed too many people in other countries, export too much steel, and not have something to come back that we can enjoy and add to our standard of living. I hope it will be a two-way street before too long. During this time right now, when we have the tremendous, continuing government expenditures, the producers of the country cannot carry the nonproducers on their backs. There is no doubt about that."

When the 40-hr week legislation was enacted, many of its supporters had the idea that by reducing the work week from 48 hours to 40 more people would be employed. As far as the automotive industry is concerned, this is not true. There are only certain places a man can work—so many machines, so many work stations, so many desks in an office. If he works only five days, the plant is just idle on the sixth day, there being no way to hire another 20 per cent of people and have them work the sixth day only.



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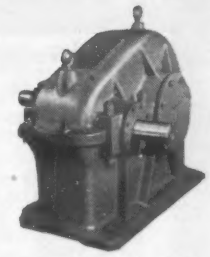
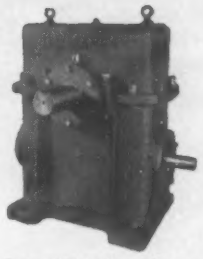
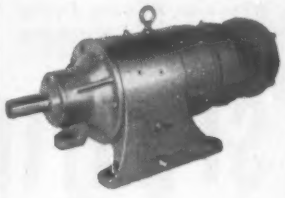


Continuous-Tooth Herringbone Gear Speed Reducers



Type "H" Worm Gear Speed Reducers

Planetary Gear Speed Reducers



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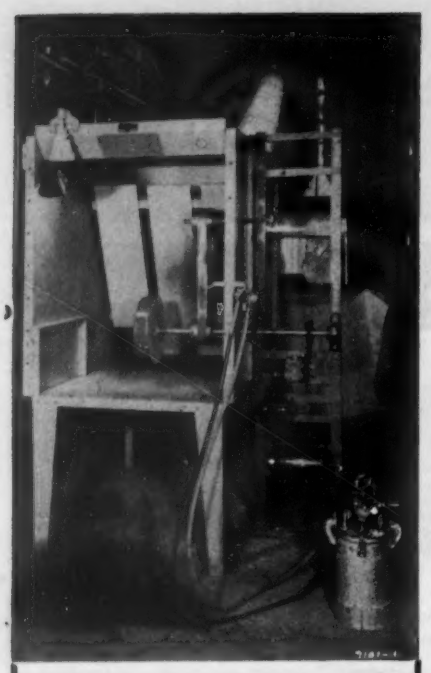

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DETROIT 9

CONSTRUCTION AND ENTERPRISE

OHIO

AKRON—Akron Machinerey Co. has been incorporated with $5000 capital and 250 shares of no par value to rebuild manufacturing machinery, by Theo. A. Hamony and associates. D. D. Silashki, 1406 Tower Bldg., is agent.

ASHLAND, O.—Union Brass & Copper Co. has been incorporated with $25,000 capital and 1000 shares no par value, to manufacture brass castings and plumbing goods, by Jack Jacobson, of Union Malleable Mfg. Co., Clark Ave.

BARBERTON, O.—Ohio Brass Co., William Marr, superintendent, Park and East Ninth Sts., will remodel plant and build an addition 110 x 451 feet, at cost of about $500,000.

CLEVELAND—North American Mfg. Co., George Brown, president, 2910 East 75th St., manufacturer of industrial gas and oil burning equipment, will build a plant at East 71st St. and Beltline railroad, Cuyahoga Heights, to cost about $283,000, for which about $30,000 worth of equipment will be bought.

CLEVELAND—Contrico Tool & Die Inc. has been incorporated with $500 capital and 200 shares no par value to manufacture tools, dies, gages, jigs and fixtures, by Alfred A. Savitt, 321 Euclid Ave., and associates.

CLEVELAND—Electric Products Inc., Robert J. Berry, president, 1725 Clarkstone Rd., is erecting a one-story plant addition 86 x 220 feet, to cost about $65,000.

CLEVELAND—Columbia Metal Stamping Co., A. E. Koch, president, 11900 Harvard Ave., will build a one-story plant addition 40 x 91 feet, to cost about $20,000.

CLEVELAND—Ohio Vault Works Inc., 3067 East 61st St., manufacturer of steel burial caskets, will build a one-story 60 x 400-foot plant structure and two-story office building at Harvard Ave. and East 116th St., to cost about $150,000.

CLEVELAND—Cleveland Cap Screw Co., 2917 East 79th St., will let contract soon for a one-story 125 x 145-foot warehouse addition. H. M. Morse & Co., 1500 Superior Ave., are engineers.

CLEVELAND—Precision Castings Co., 12600 Berea Rd., will take bids in November for a one-story factory addition to cost about $210,000. E. G. Hoefler, 5005 Euclid Ave., is consulting engineer.

CLEVELAND — Universal Wire Spring Co., 2260 East 69th St., will take bids soon for a two-story 58 x 161-foot and one-story 18 x 30-foot plant addition to cost about $70,000. Christian, Schwartzenburg & Gaede, 1836 Euclid Ave., are engineers.

CLEVELAND—Reynard Tool & Gauge Co., 3539 West 25th St., will build plant 75 x 150 feet on 12-acre site on Brookpark Rd., opposite Snow Rd.

CLEVELAND—East Ohio Gas Co., 1405 East Sixth St., has let contract to Hunkin-Conkey Construction Co., 1740 East Twelfth St., for a two-story 200 x 250-foot meter repair shop, estimated to cost about $750,000.

DAYTON, O.—Dayton Power & Light Co., 25 North Main St., has let contract to F. X. Minnegan, 16 Bates St., for a one-story 60 x 120-foot salvage shop and service building, costing about $60,000. Lorenz & Williams, 223 West First St., are architects.

ELYRIA, O.—General Motors Corp., Detroit, has let contract to Austin Co., 16112 Euclid Ave., Cleveland, for design and construction of 392,000-square foot plant and 65,000-square foot office building, estimated to cost about $3 million. (Noted Sept 10.)

GALION, O.—Carter Machine Co., A. M. Carter, president, has plans by Althouse & Jones, 1104 Farmers Bank Bldg., Mansfield, O., for a 52 x 260-foot factory building, to cost about $50,000.

MANSFIELD, O.—Mansfield Metal Vault Co., Elmer N. Hedeen, president, 210 West Longview Ave., will build an addition 60 x 300 feet, to cost about $40,000.

NEWTON FALLS, O.—Falls Welding & Mfg. Co. has been incorporated with $500 capital and 250 shares no par value to fabricate steel products, by United Welding Service, 1721 West Market St. J. D. Campbell, Franklin Bldg., Warren O., is agent.

TOLEDO, O.—Libbey-Owens-Ford Glass Co., Nicholas Bldg., has let contract to George W. Lathrop & Sons Inc., 1510 Montcalm St., for a one-story plant addition estimated to cost about $179,000. Bellman, Gillet & Richards, 518 Jefferson St., are architects.

YOUNGSTOWN—Arms Franklin Corp., M. I. Arms, president, Mahoning National Bank Bldg., steel machinery manufacturer, has bought Taylor-Wilson Mfg. Co., McKees Rocks, Pa., manufacturer of tube mill equipment, and will operate it as a subsidiary, adding other products.

RHODE ISLAND

PROVIDENCE, R. I. — Narragansett Electric Co., 49 Westminster St., has let contract to United Engineers & Constructors Inc., 1401 Arch St., Philadelphia, for a switch house costing about $135,000.

NEW JERSEY

NEW BRUNSWICK, N. J.—Ford Motor Co., Dearborn, Mich., has bought 70 acres near here for automotive assembly plant containing 500,000 square feet floor space for assembly, and oil storage building and warehouse.

PENNSYLVANIA

ALLENTOWN, PA.—Western Electric Co., subsidiary of American Telephone & Telegraph Co., New York, has bought 42 acres near here for electronics components plant, including manufacturing building of 250.000 square feet and office building of 50,000 square feet. Austin Co. is architect and engineer.

CORRY, PA.—Corry-Jamestown Mfg. Co., A. Dahlstrand, manager, 35 North First St., has let contract to H. Platt Co., 922 Raspberry St., Erie, Pa., for a one-story 75 x 180-foot plant building. (Noted Sept. 10.)

PITTSBURGH — Fisher Scientific Co., 711 Forbes St., has let contract to F. Hoffman Co., 901 Wood St., Wilkinsburg, Pa., for a five-story 112 x 140-foot shop building, to cost about $500,000. Hunting, Davis & Dunnells, 1150 Century Bldg., are architects.

MICHIGAN

DETROIT—Detroit Bevel Gear Co., 8130 Jos. Campau Ave., has plans by Shreve, Anderson & Walker, Guaranty Bldg., for a gear manufacturing plant costing about $50,000.

DETROT—Automatic Jacks Inc., 1611 Book Bldg., has been incorporated with $50,000 capital to manufacture mechanical devices, by Harry F. Preston, same address.

DETROIT—C. & M. Mfg. Co., 20 Kenilworth Ave., has been incorporated with $20,000 capital to manufacture tools, dies, jigs, gages and fixtures, by F. Clemons ,same address.

DETROIT—John S. Brown & Co. Inc., 546 West Jefferson Ave., has been incorporated with $100,000 capital to manufacture tools, machines and machinery, by Wilford H. Rohlfa, 514 Holmes Rd., Ypsilanti, Mich.

DETROIT—Overhead Conveyor Co., 19616 Fleming St., Detroit, has been incorporated with 100 shares no par value to manufacture conveyors and equipment, by Olaf Ostrom, 18401 Margareta St., Detroit.

ROYAL OAK, MICH.—Wall-Mo Corp., 521 Washington Square Bldg., has been incorporated with $25,000 capital to manufacture special tools, machinery and equipment, by

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ILLINOIS

CHICAGO — Automatic Device Corp., 530 South Throop St., plans one-story plant at Bellwood, Ill., to cost about $50,000 with equipment.

KANKAKEE, Ill.—A. O. Smith Corp., 3533 North 27th St., Milwaukee, has let general contract to B. W. Construction Co., 307 North Michigan Ave., Chicago, for a one-story 300 x 1200-foot building here, to cost about $2 million, including factory, office and power plant. (Noted Oct. 22.)

KANKAKEE, ILL.—Armstrong Cork Co., Lancaster, Pa., will let contract soon for a manufacturing plant group to cost $150,000 or more. H. J. Kuljian & Co., 1518 Walnut St., Philadelphia, are architects.

INDIANA

HUNTINGTON, IND.—Hosdreg Co. Inc. has bought a plant here for manufacture of power pumps. Company recently sold its former plant to another manufacturer.

MUNCIE, IND.—Moore Tool & Engineering Corp., care J. L. Moore, has been incorporated with 1000 shares no par value to manufacture tools, dies and similar products, by J. L. Moore, C. G. Moore and R. A. Schuster.

NEW ALBANY, IND.—Gunnison Homes Inc., F. A. Gunnison, president, Thirteenth and McBeth Sts., has plans for a one-story 350 x 550-foot prefabricated housing manufacturing plant, to cost about $1 million. C. D. Russell, Forest Lane, Louisville, Ky., is architect.

PERU, IND.—Centru Cast Corp., care S. H. Arnolt, has been incorporated with 1100 shares of $100 value to manufacture steel castings and do a general wholesale business, by S. H. Arnolt, N. D. Walker, C. E. Bunyan and associates.

WEST VIRGINIA

WEIRTON, W. VA.—Continental Can Co., 100 East 42nd St., New York, plans can-making plant on 146-acre site here, to cost about $500,000.

VIRGINIA

FREDERICKSBURG, VA. — Sylvania Industrial Corp., Fredericksburg, has let contract to Hughes Foulkrod Co., 1505 Race St., Philadelphia. for a plant addition costing about $75,000.

MISSOURI

ST. LOUIS—United States Steel Supply Co., 716 South 21st St., has let contract to American Bridge Co., 208 South LaSalle St., Chicago, for design and erection of 335 x 436-foot warehouse at Duncan Ave. and Sarah St., to cost about $1 million, with equipment.

ST. LOUIS—McQuay-Norris Mfg. Co., 2320 Marconi Ave., has let contract to H. B. Deal & Co. Inc, 1218 Olive St., for a 100 x 160-foot addition to its No. 2 building, to cost over $40,000 with equipment.

ST. LOUIS—McCabe Powers Auto Body Co., 5900 North Broadway. has let contract to Fruin-Colnon Contracting Co., 406 Olive St., for a one-story 60 x 132-foot factory building at 5626 North Broadway. P. C. Ramsay, Webster Groves, St. Louis 19, is architect.

WISCONSIN

MILWAUKEE—American Welding & Engineering Corp., 820 South Water St., has plans by F. J. Hinton, 1721 North Water St., for a one-story factory, 80 x 200 feet, to cost about $50,000.

MILWAUKEE — Milwaukee Saw Trimmer Corp., 612 East Clybourn St., has let contract to Charles Maier & Son, 1623 North 30th St., for a one-story 120 x 121-foot plant building, to cost about $40,000. A. L. Seidenschwartz, 2104 North 64th St., is architect.

IOWA

GRINNELL, IOWA—Grinnell College has let contract to Pittsburgh-Des Moines Steel Co. for structural steel for a one-story foundry 80 x 300 feet, to be leased and operated by Lennox Furnace Co., Marshalltown, Iowa. (Noted Sept. 10.)

DES MOINES, IOWA—Armco Drainage & Metal Products Co. Inc., manufacturer of metal culverts and drainage pipe, has let contract for a one-story plant 120 x 160 feet.

COLORADO

DENVER—Ford Motor Co., Dearborn, Mich., will let contract soon for a one-story parts building to cost about $500,000. Giffels & Vallet, 1000 Marquette Bldg., Detroit, are architects and engineers.

MONTANA

FORT BENTON, MONT.—City, L. C. Wrights, clerk, has called bids Nov. 1 for a 400,000-gallon steel water storage tank and 2500 feet of 4, 6 and 8-inch pipe and fittings. Plans are by Gorwin & Co., Great Falls, Mont.

CALIFORNIA

LOS ANGELES—Fluid Packed Pump Co., 2142 Norwalk Ave., Los Nietos district, is building a plant addition 40 x 127 feet, to cost about $12,000.

LOS ANGELES—Pacific Rivet & Machine Co., has been incorporated with 2500 shares no par value and is represented by O'Melveny & Myers, 433 South Spring St.

LOS ANGELES—Western Water Works Supply Co. has been incorporated with 2500 shares no par value and is represented by Clyde Thomas, 609 South Grand Ave.

LOS ANGELES—Spence Electroplating Co. has been incorporated with $50,000 capital, by John A. Cronin, 629 Citizens National Bank Bldg., and associates.

LOS ANGELES—Aircraft Service Associates Inc. has been incorporated with $100,000 capital by R. A. Nordskog and associates. Company is represented by Howlett & Williams, 649 South Olive St.

SOUTH GATE, CALIF.—City has awarded contract to Chicago Bridge & Iron Co., 608 South Hill St., Los Angeles, for a 500,000-gallon welded steel water tank, to cost about $82,830.

VERNON, CALIF.—Norris Stamping & Mfg. Co., 5215 South Boyle Ave., is building an addition 18 x 150 feet, to cost about $30,000.

WASHINGTON

GRANDVIEW, WASH.—City plans enlargement of its sewage treatment plant at cost of about $90,000. James W. Carey, Seattle, is architect.

HOQUIAM, WASH.—Grays Harbor Machinery & Electric Co. has let contract to Grays Harbor Construction Co. for a two-story steel shop building.

SEATTLE—Ford Motor Co., Dearborn, Mich., is having plans prepared by Giffels & Vallet and L. Rosetti, Detroit, for a factory and distribution building at Fourth Ave. South and Spokane Ave., 225 x 400 feet, to cost about $775,000. (Noted Aug. 20 and Oct. 22.)

SEDRO-WOOLLEY, WASH.—Plans are being prepared for a $550,000 sewage treatment plant at the state hospital. A $50,000 water system is also projected.

SPOKANE—Western Light Metals has been incorporated with $10,000 capital by D. W. Walters and associates, 1070 South Wall St.

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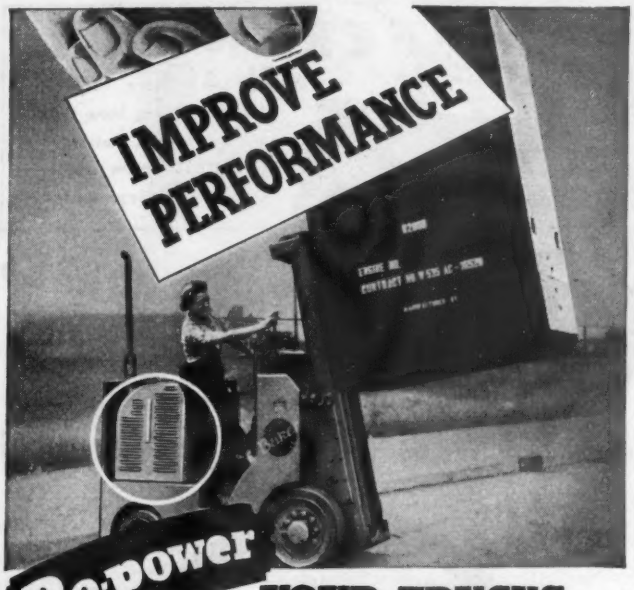

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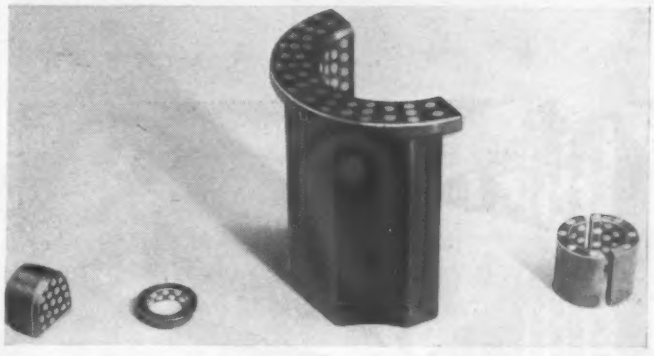

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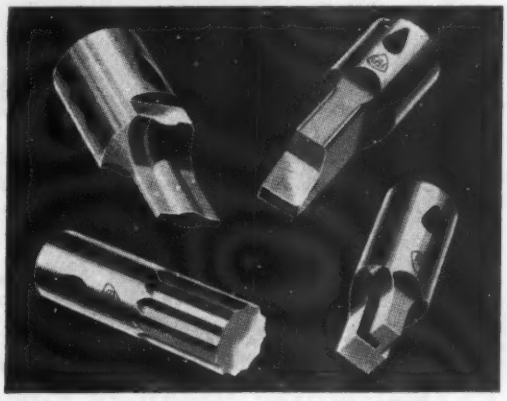

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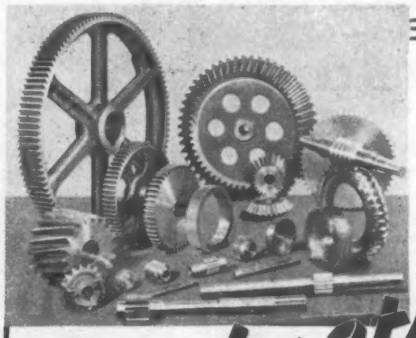

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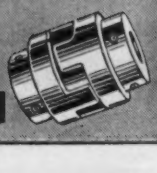

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JR. EXECUTIVE: AGE 27, WITH EXPERIENCE AS TOOL AND DIE MAKER, DEPARTMENTAL SUPERINTENDENT, AND DESIGNER; ON PRECISION PRODUCTS. RESPONSIBLE, GOOD JUDGMENT, TRAINED SUPERVISOR. BROAD TECHNICAL AND LIBERAL EDUCATION. DESIRES POSITION AS ASSISTANT SUPERINTENDENT OR EQUIVALENT WITH SMALL PROGRESSIVE FIRM. ADDRESS BOX 268, STEEL, PENTON BLDG., CLEVELAND 13, O.

PRODUCTION AND INDUSTRIAL ENGINEER: 20 years experience, 9 years sales engineering production equipment, desires to represent a manufacturer of production equipment or supplies, on commission or salary and commission covering southern Indiana, Ohio and central Kentucky. Address Box 272, STEEL, Penton Bldg., Cleveland 13, O.

SALES ENGINEER. GRADUATE STRUCTURAL engineer, age 36, with 17 years experience as estimator and field engineer with one structural steel company, wishes to change to sales work. Prefer selling products to contractors or manufacturers on commission basis. Available immediately. Address Box 227, STEEL, Penton Bldg., Cleveland 13, O.

STEEL BUYER. 25 YEARS' EXPERIENCE steel buying, inventory control, estimating and expediting. Can take charge of Order Department, or complete Purchasing Department of smaller company. Preferred location, Pennsylvania, Ohio or West Virginia. Address Box 269, STEEL, Penton Bldg., Cleveland 13, O.

MECHANICAL ENGINEER WITH TEN YEARS experience on tools, dies, special machine designing, research and development, plant layouts, purchasing and supervising desires position as manager or executive assistant. Address Box 264, STEEL, Penton Bldg., Cleveland 13, O.

SALESMAN HANDLING ALL TYPES OF STEEL products for large steel manufacturer over period of 12 years desirous of acquiring sales or sales managerial position. Prefer Ohio territory. Also well acquainted Indiana. Address Box 257, STEEL, Penton Bldg., Cleveland 13, O.

REPRESENTATIVE WELL KNOWN THROUGHout Northern Ohio and Southern Michigan, located in Toledo, wishes to represent a Steel Company. Address Box 246, STEEL, Penton Bldg., Cleveland 13, O.

Opportunities

MACHINE SHOP WANTED

Will pay cash for a one-story Machine Shop suitable for medium-heavy work. Equipment required—66" horizontal boring mill, 3" bar horizontal, No. 3 milling machine, 16" engine lathes, large shaper, 6' radial drills, 2" turret lathes, tool room, 5 to 10 ton crane. Will also consider sub-contracting our work with or without capital investment. Eastern Penna. district preferred. Principals only.

Address Box 266,
STEEL, Penton Bldg., Cleveland 13, O.

Representatives Wanted

WANTED
TOOL STEEL REPRESENTATIVE

Distributor of a complete line of tool steels, high-speed cutting tools, drill rod and tool steel castings has an opening for an experienced steel engineer to cover the Cincinnati, Dayton and Indianapolis area.

Address Box 222, STEEL, Penton Bldg.
Cleveland 13, O.

FACTORY REPRESENTATIVE

To represent manufacturer of shot-blast and grit. No objection to other non-conflicting lines. Substantial commission. Advise territory being covered, and lines carried, sales background and type of trade contacting. Give phone and address for personal interview. Address Box 252, STEEL, Penton Bldg., Cleveland 13, O.

Accounts Wanted

MANUFACTURERS' REPRESENTATIVE IN Detroit. Two sales engineers, with exceptional background in automotive and other industries, want additional line. Engineering assistance and service to your prospective customer assures results. Address Box 270, STEEL, Penton Bldg., Cleveland 13, O.

NORTHERN CALIFORNIA — A TWO MAN TEAM WITH INTIMATE KNOWLEDGE OF THIS MARKET WOULD LIKE TO HEAR FROM A STEEL COMPANY LOOKING FOR CRACK REPRESENTATION. ADDRESS BOX 255, STEEL, PENTON BLDG., CLEVELAND 13, O.

PITTSBURGH SALES REPRESENTATIVE well acquainted with manufacturers in this territory can take care of an additional account on a straight commission basis. Address Box 267, STEEL, Penton Bldg., Cleveland 13, O.

EXPAND
YOUR REPRESENTATION . . .

An advertisement here puts you in touch with trained, efficient, reliable men looking for new lines. Write STEEL, Penton Bldg., Cleveland, O.

OPPORTUNITIES
AND PROFITS

are of equal interest to distributors and manufacturers—use an ad on this page next week to let manufacturers know you are interested in taking on new lines.

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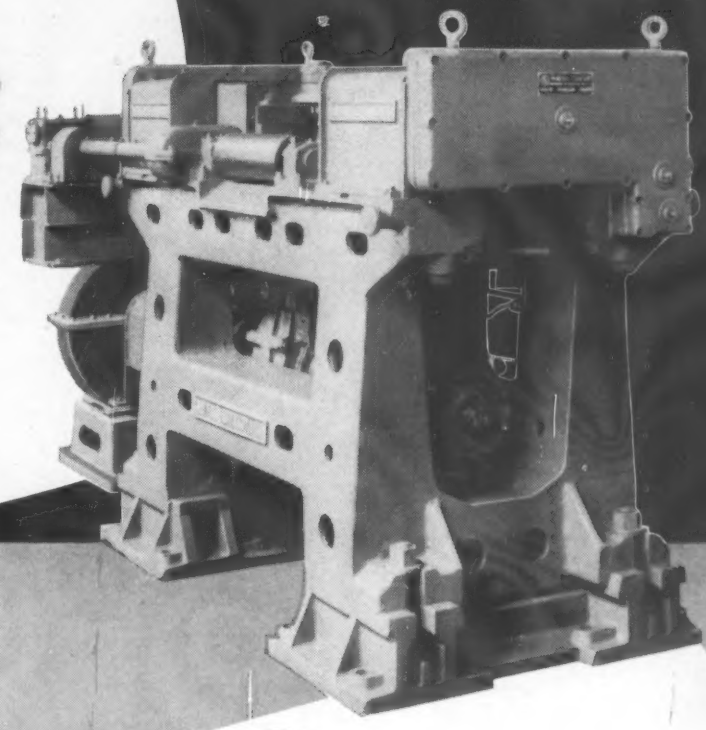
EDGING MILLS

by Aetna-Standard

18" Vertical Edging Mill



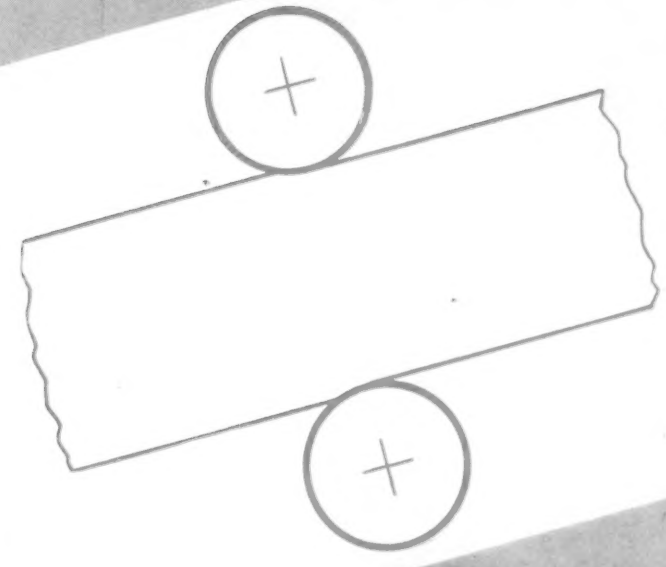
These two vertical edging mills serve as scale breakers as well as edgers.

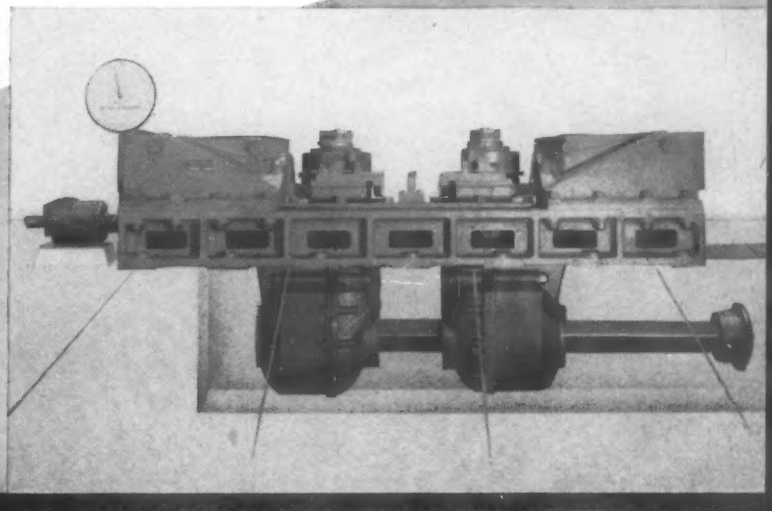
The 38" mill handles slabs from 3 to 8½ inches thick by 20 to 66 inches wide. The 18" mill processes slabs from 2 to 6 inches thick and 2 to 24 inches wide.

Both mills have the many design and engineering features which Aetna-Standard builds into other equipment for processing flat, rolled, and tubular products.

Aetna-Standard also builds complete rolling mills, furnace charging and discharging tables, furnace pushers, structural mill tilting tables, mill run-out tables, and similar equipment.

Ask Aetna-Standard for recommendations on your mill equipment requirements.





38" Vertical Edging Mill is powered by a 1000 h. p., 600 r. p. m. motor and has a slab rolling speed of approximately 350' per minute.

THE AETNA-STANDARD ENGINEERING COMPANY

YOUNGSTOWN, OHIO

ASSOCIATED COMPANIES:

HEAD, WRIGHTSON & COMPANY, LIMITED
THORNABY-ON-TEES, ENGLAND

JOHN INGLIS COMPANY, LIMITED
TORONTO, ONTARIO, CANADA

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